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No. 554

JOINT APPENDIX

IN THE

United States Court of Appeals

FOR THE FOURTH CIRCUIT

No. 7383

LONG MANUFACTURING COMPANY, INC., LONG TOBACCO HARVESTING COMPANY, INC. and WILLIAM R. LONG,
Appellants,

v.

JIM BROWN HOLLIDAY and HARRINGTON MANUFACTURING COMPANY, INC.,
Appellees.

No. 7384

HARRINGTON MANUFACTURING COMPANY, INC. and JIM BROWN HOLLIDAY,
Appellants,

v.

LONG MANUFACTURING COMPANY, INC.
Appellee.

Appeal From the United States District Court for the Eastern District of North Carolina, Washington Division

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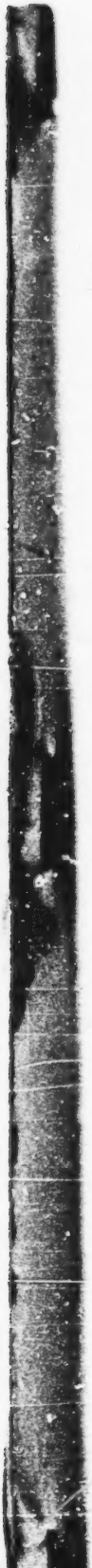

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Appellee.

Appeal From the United States District Court for the Eastern District of North Carolina, Washington Division

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JOINT APPENDIX

IN THE DISTRICT COURT OF THE UNITED STATES

THE EASTERN DISTRICT OF NORTH CAROLINA, WASHINGTON DIVISION

CIVIL—NOS. 340 & 350

Civil No. 340

JIM BROWN HOLLIDAY and HARRINGTON MANUFACTURING COMPANY, INCORPORATED,

Plaintiffs,

v.

LONG MANUFACTURING COMPANY, INC.; LONG SUPPLY COMPANY, INC.; LONG TOBACCO HARVESTING COMPANY, INC.; WILLIAM R. LONG; JOHN G. LONG; JAMES O. HALL,

Defendants.

(Civil No. 350)

LONG MANUFACTURING COMPANY, INC.,

Plaintiff,

v.

HARRINGTON MANUFACTURING COMPANY, INC.; J. J. HARRINGTON; C. B. STANFIELD; V. E. FOUNTAIN; ETHEL J. HARRINGTON; JIM BROWN HOLLIDAY,

Defendants.

(Filed November 30, 1956.)

Consolidated Memorandum Opinion

These two actions were consolidated for hearing. Both plaintiffs allege patent infringement and unfair competition in the defendants' production and sale of a tobacco harvesting machine. The same facts are at issue in both cases.

The parties consented at the trial to dismiss the defendants Long Supply Company, Inc.; John G. Long; and James O. Hall from the action brought by Holliday and

Harrington Manufacturing Company, Inc. against Long Manufacturing Company, Inc., *et al.* Similarly, C. B. Stanfield, V. E. Fountain, Ethel J. Harrington, and Ethel B. Harrington were dismissed as defendents from the action by Long Manufacturing Company, Inc., against Harrington Manufacturing Company, Inc., *et al.*

Before considering the controversy presented in these consolidated cases, it will be helpful to look generally at the tobacco harvesting problem as it existed prior to 1952, when the first concrete steps toward its solution were taken by the litigant, Jim Brown Holliday.

The bright leaf, flue cured tobacco cultivated in North Carolina, Virginia, and other Southern states is grown from seed in sheltered plant beds. In spring the young plants are reset in regularly spaced rows through the fields. Fully grown plants are about five to seven feet in height. Broad tobacco leaves, from six inches to two feet long, grow directly out of the stalk, beginning a few inches above ground level and continuing at intervals to the top of the stalk.

The leaves do not mature uniformly. The whole plant cannot be harvested at one time. Bottom leaves are the earliest to ripen. Others follow progressively until the tip leaves are reached. Thus a single field may be harvested or primed from three to six times within a single season.

Ripe leaves must be selected by hand. The customary process was for pickers or primers to walk between the rows of tobacco, take the leaves ready for curing and place them in a small wagon or sled. The conveyance filled in this manner is pulled out of the field to a place where "handers" make convenient bundles of the leaves and pass the bundles by hand to "loopers", who attach them with cotton twine about the stems to a stick. The sticks, with many bundles of tobacco leaves tied to each, are placed on racks to await removal to similar racks in a curing barn.

This traditional system of "barning" tobacco involves direct handling of the leaves by three different groups of workers, to wit, "primers", handers", and "loopers".

Expenses to the producer resulting from high labor costs and a damaged product were excessive. The labor was arduous and slow.

In 1952, Jim Brown Holliday was farming near Jamesville, North Carolina. With the aid of a machine shop in Williamston, North Carolina, he built a high clearance, tobacco harvesting machine. Like many "firsts", Holliday's first model was a rather crude apparatus. There was a poor tobacco crop that summer. The machine was mainly used for spraying insecticides. However, Holliday's limited trials of his machine as a harvester convinced him that the basic idea was sound.

High clearance machines, in the farm implement art, are devices which roll through a field and pass over the tops of growing plants, leaving them unharmed. Such machines have long been used for such purposes as detasseling corn, spraying, and dusting crops. Never had one been made for independent use in tobacco leaf harvesting. Holliday's idea consisted of mounting on the overhead platform, racks for the tobacco sticks in a convenient location for the looper to tie the leaves as they passed up to him in clips on a conveyor chain from the primer riding beneath the platform in an adjustable seat adjacent to the tobacco and to the lower reach of the conveyor chain. The conveyor chain was hand operated.

Through the fall and winter he worked to improve his harvester. When the 1953 summer harvest season arrived, he was ready with a machine that had power driven conveyor chains. This improved version of Holliday's machine operated in the field on July 3, 1953, and was given some publicity in the nearby Williamston newspaper.

On October 9, 1953, Holliday applied for his patent. March 16, 1954, Patent No. 2,672,248 was issued to him. Meanwhile on March 5, 1954, he entered into a contract with Harrington Manufacturing Company, Inc., whereby Harrington was granted an exclusive license to manufacture harvesters under Holliday's patent. Holliday himself managed sales for Harrington. Roanoke Holliday

Tobacco Harvesters appeared on the market for the 1954 harvest season.

W. R. Long, of Tarboro, North Carolina, entered the farm implement business in 1943. For some time prior to 1953 he had entertained the idea of making a tobacco harvesting machine. His first steps toward that end were taken in June of that year when he and his draftsman, W. E. Davis, launched a building program as two different harvesters.

The Davis machine featured an automatic looper or sewing head for which he later obtained a patent (No. 2,715,-968). His machine was tested July 9, 1953. Long was not satisfied with its performance and did nothing further with it.

The second machine built in Long's plant was first tried out July 13 and 14, 1953. Long and his employees ran further tests with it through July and August. Several thousand people came to a widely publicised demonstration on Labor Day, September 7, 1953. Three more such machines made by Long were displayed at the North Carolina State Fair in mid-October of that year.

Long was encouraged by the reception accorded his machines. He set up production and sales organization and equipment at substantial expense. The venture enjoyed considerable commercial success in the 1954 season and again in 1955.

The W. R. Long patent application was not made until July 28, 1954. While it was pending, an examiner attempted to force Long to set up an interference with claim No. 7 of Holliday's patent, which I shall set out in full later. Upon review in the Patent Office, it was held that the examiner was not authorized to force Long into an interference. The basis of that decision was that forced interferences are available when the subject matter of a prior patent is being claimed in different language, but not when the applicant simply refuses to make any claim which conflicts with the claims of a prior patent. The decision only dealt with Patent Office procedure. It is not subject

to the interpretation that a device made by Long would not infringe Holliday's patent. It merely upheld Long's privilege to decline allowing that question to be determined in the Patent Office. In this connection it may be added that lack of interference at the Patent Office is not conclusive of noninfringement. *The University of Illinois Foundation* v. *Block Drug Co.*, 123 F. Supp. 590, and cases cited therein. Long got his patent March 15, 1955.

The first controversy presented by this case ranges around claim No. 7 of the Holliday patent, which reads as follows: "A tobacco harvester comprising a frame, wheels supporting said frame, vertical members secured to said frame in spaced relationship to each other, vertically extending conveyor chains carried by said vertical members, drive means for actuating said chains, a platform secured on top of said frame, said chains extending upwardly above said platform from there below, said chains having spring pressed clips attached thereto for resiliently engaging and carrying tobacco leaves, a plurality of seats, and means adjustably suspending said seats from said vertical members in back of said chains."

During the trial, the Court made a first hand comparisor of the machine manufactured by Harrington and the one manufactured by Long. They are very nearly alike. Holliday and Harrington contend that if Holliday's claim No. 7 is accorded due scope, Long's harvester constitutes an infringement, despite the inclusion on the accused harvester of certain unpatentable improvements. Long contends that Harrington has never manufactured a machine within the scope of Holliday's patent. He says that Harrington, with the aid of Davis and others hired from Long's company, copied the Long machine, which was proving to be a commercial success, and infringed his patent. It is also denied that his machine infringes the Holliday patent.

The device described in Holliday's claim No. 7 is clearly worthy to be designated an invention. It is not "wanting in (any) unusual or surprising consequences from the unification of the elements here concerned. . . ." *A. & P. Tea*

Co. v. *Supermarket Corp.*, 340 U. S. 147 at 152. Is it, however, a pioneer invention entitled to a broad range of equivalents? I believe that it is.

In *Westinghouse* v. *Boyden Power Brake Co.*, 170 U. S. 537, at 561, the Supreme Court discussed the term "pioneer" as it is used in patent law. "This word, although used somewhat loosely, is commonly understood to denote a patent covering a function never before performed, a wholly novel device, or one of such novelty and importance as to mark a distinct step in the progress of the art, as distinguished from a mere improvement or perfection of what had gone before. Most conspicuous examples of such patents are: The one to Howe, of the sewing machine; to Morse, of the electrical telegraph; and to Bell, of the telephone."

From *Deam Rubber Mfg. Co.* v. *Killian*, 106 F. 2d, 316 at 319, I quote the following language, substituting the name of Holliday for that of Killian. "Holliday was the first to produce a machine which successfully performed the function which had been formerly done by hand, and the mechanical performance of which had been long sought by the industry, and . . . the machine of the patent is, therefore, a pioneer invention."

The key word in Holliday's claim No. 7 is "vertical". The claim calls for "vertical members", "vertically extending conveyor chains", "means adjustably suspending said seats from said vertical members". The illustrations that accompany Holliday's patent show these parts to be truly vertical. However, the scope of patent claims are not to be strictly limited to the form illustrated in drawings. *Oates* v. *Camp*, 83 F. 2d, 111; *Pongborn Corp.* v. *W. W. Sly Mfg. Co.*, 284 F. 217. In neither the Long machine nor the one manufactured by Harrington are all the frame members or all stretches of the conveyor chains truly vertical. They are substantially vertical.

Long contends that Holliday's claim is limited to a harvester with chains and side members, absolutely vertical. Holliday contends that "vertical member" in claim

No. 7 refers to an entire side of the frame, the whole of which is in a truly vertical plane, and that the term does not refer merely to an individual element of the frame, which, though in the vertical plane of the whole, is not individually vertical. To clarify this contention, consider the letter N. Holliday says the entire character constitutes the "vertical member", not the slanting cross-bar solely. Holliday further argues that, if "vertical member" is not construed in his favor, the word "vertical" should be interpreted, or broadened, by the doctrine of equivalents, to include "substantially vertical".

The harvester illustrated in Holliday's patent is the model that he had in operation during the summer of 1953. It was truly a "homemade" machine. Modification and streamlining were necessary before the device could be produced commercially. As was pointed out in the much cited case, *Hildreth* v. *Mastoras*, 257 U. S. 27 at 34: "It is not necessary, in order to sustain a generic patent, to show that the device is a commercial success. The machine patented may be imperfect in its operation; but if it embodies the generic principle, and works, that is, if it actually and mechanically performs, though only in a crude way, the important function by which it makes the substantial change claimed for it in the art, it is enough." I hold that the scope of Holliday's generic, or pioneer, patent is not limited to coverage of replicas of his original embodiment of the invention.

Claims are interpreted in the light of their file-wrapper history. A narrow claim that is allowed may not be broadened to encompass the subject matter of a wider claim that has been denied by the examiner. *Exhibit Supply Co.* v. *Ace Corp.*, 315 U. S. 126; *Schriber-Schroth Co.* v. *Cleveland Trust Co.*, 311 U. S. 211; *Smith* v. *Florence-Mayo Nuway Co.*, 182 F. 2d, 507. Holliday's history in the Patent Office indicates that he was under no compulsion to word his claim as it was done. "Vertical" was a random adjective chosen to describe the then existing form of the tobacco harvester. This is not a design patent. Form is

not the essence of Holliday's invention. Form bears no more than an incidental relationship to the function that the device is designed to perform.

In *Specialty Equipment & Mach. Corp.* v. *Zell Motor Car Co.*, 193 F. 2d, 513, the Court of Appeals for this Circuit had occasion to review at some length the doctrine of equivalents. The following language is from that opinion, page 518: "Very pertinent here with respect to the application of the doctrine of equivalents on the issue of infringement is the statement of the rule contained in *Union Paper Bag Machine Co.* v. *Murphy*, 97 U. S. 120, 125, as follows: " 'Except where form is of the essence of the invention, it has but little weight in the decision of such an issue, the correct rule being that, in determining the question of infringement, the court or jury, as the case may be, are not to judge about similarities or differences by the names of things, but are to look at the machines or their several devices or elements in the light of what they do, or what office or function they perform, and how they perform it, and to find that one thing is substantially the same as another, if it performs substantially the same function in substantially the same way to obtain the same result, always bearing in mind that devices in a patented machine are different in the sense of the patent law when they perform different functions or in a different way, or produce a substantially different result.

" 'Nor is it safe to give much heed to the fact that the corresponding device in two machines organized to accomplish the same result is different in shape or form the one from the other, as it is necessary in every such investigation to look at the mode of operation or the way the device works, and at the result, as well as at the means by which the result is attained . . .

" 'Authorities concur that the substantial equivalent of a thing, in the sense of the patent law, is the same as the thing itself; so that if two devices do the same work in substantially the same way, and accomplish substantially the same result, they are the same, even though they dif-

fer in name, form, or shape. Curtis, Patents, 4th Ed., Sec. 310.' "

Graver Tank Mfg. Co. v. *Linde Air Products Co.*, 339 U. S. 605, presents a Supreme Court consideration of the doctrine of equivalents in which the foundation of the doctrine is repeated as being that one may not practice a fraud on a patent. The invention at stake was a formula for a flux used in welding. The accused substance substituted for a chemical named in the formula of the patentee's claim, a chemical from a different chemical group, which in combination with the patentee's other ingredients, produced the same reaction as that obtained with the patentee's complete formula.

The Court upheld the District Court's finding of equivalence in the accused formula and included the following language at page 609. "What constitutes equivalency must be determined against the context of the patent, the prior art, and the particular circumstances of the case. Equivalence, in the patent law, is not the prisoner of a formula and is not an absolute to be considered in a vacuum. It does not require complete identity for every purpose and in every respect. In determining equivalents, things equal to the same thing may not be equal to each other and, by the same token, things for most purposes different may sometimes be equivalents. Consideration must be given to the purpose for which an ingredient is used in a patent, the qualities it has when combined with the other ingredients, and the function which it is intended to perform. An important factor is whether persons reasonably skilled in the art would have known of the interchangeability of an ingredient not contained in the patent with one that was."

I have already pointed out the context in which "vertical" was used in Holliday's patent. I have already undertaken to show that his invention was a pioneer in the field. I now propose to consider the functional purposes served by the "vertical" elements in Holliday's device and the interchangeability of those elements that would have

been perceived by a reasonably skilled person in the farm implement art.

In Holliday's illustrated machine and in the machines manufactured by Harrington and Long, primers are carried beneath a platform that passes over the top of the tobacco plants. Conveyor chains and members attached to the frame connect the upper and lower levels of the harvesters. The frame members and chains necessarily extend in an upward, downward direction, since they serve to connect a higher and lower plane. It is of no consequence to the maintenance of this connection that it varies from a true 90 degree vertical. No advantage is derived from the variation.

Holliday and Harrington aptly point out in their brief that: "There is one point in the travel of the tobacco-carrying chains where it is desirable that the chains travel in a substantially vertical direction, using vertical in the restricted sense. This is the place in front of where the primer or picker sits. When it is realized that the seat on which the picker sits can be moved up and down over a distance of some three or four feet, it can be seen why it is desirable that the chain in front of him be moving substantially in a specifically vertical direction in order that he not be moved either toward or away from the chain when the position of his seat is altered in an upward or downward direction. In this sense, there is a reason for a portion of the chain to move in a specifically vertical direction. An inspection of the Long patent shows that this portion of the chain in the Long machine also moves in a specifically vertical direction, for exactly the same reason. The most recent model of the Long machine has long stretches of vertical chains, and also vertical seat supports."

The quibble in this case over the word "vertical" brings to mind the Supreme Court's disposition of a similar contention regarding the word "parallel" found in *Elizabeth v. Pavement Co.*, 97 U. S. 126 at 138. "It is objected, that the blocks of the Elizabeth pavement have not parallel

sides, as prescribed in Nicholson's patent, by reason of the notch or groove in the side, into which the strips are fitted; but this notch or groove does not take from the blocks their general conformity to the requisition of the patent."

Turning now from Holliday's patent, let us consider the alleged infringement of Long's patent. Holliday and Harrington insist that Long's patent is completely void by reason of Title 35, U. S. C. A., Sec. 102, which proscribes the issuance of a patent for an invention that has been in public use more than one year before the patent application date. As I indicated earlier, I do not find that the evidence lends any support to the theory that the use of Long's harvester between July 14 and July 28, 1953, was, in any sense, other than experimental.

The part of Long's patent alleged to be infringed is that which calls for "a conveyor . . . having a subtsantially horizontal run of substantial extent above said platform to facilitate removal of leaves from said conveyor, a series of clips carried by said conveyor for receiving leaves to be conveyed, each clip being pivotally mounted so that it will be disposed in substantially the same angular position on the run where they are removed therefrom, . . ." A horizontal run of the conveyor chain and pivotal clips are not found in Holliday's patent. Long's harvester and the type made by Harrington have pivotal clips. Harrington extended the chain in a zig-zag manner. Also merely horizontal.

I do not agree with Holliday and Harrington that Long's pivotal clips and chain arrangement are "mere structural changes which involve nothing more than the exercise of the skill of the art (and) do not rise to the dignity of invention". *Thompson* v. *American Tobacco Co.*, 174 F. 2d, 773, 777. They added a decided advantage to the operation of the harvesters in which they were incorporated. The two improvements, in combination, serve to give the looper more time to remove the tobacco from the chain.

And in addition to this is the presumption arising from the imitation of the patented article by the manufacturer of the alleged infringing device. As to this, we agree with what was said by Judge Hough, speaking for the Circuit Court of Appeals of the Second Circuit in *Kurtz* v. *Belle Hat Lining Co.*, 280 F. 277, 281: " 'The imitation of a thing patented by a defendant, who denies invention, has often been regarded, perhaps especially in this circuit, as conclusive evidence of what the defendant thinks of the patent, and persuasive of what the rest of the world ought to think.' " *Black & Decker Mfg. Co.* v. *Baltimore Truck Tire Serv. Corp.*, 40 F. 2d, 910, 914. See also *Ackermans* v. *General Motors*, 202 F. 2d, 642. Long's patent is not invalid for want of invention.

However, it is only a patent for improvements on Holliday's pioneer invention. An improvements patent is accorded only a narrow range of equivalents. Its scope is limited substantially to the devices disclosed in the specifications and drawings. *Westinghouse Electric Corp.* v. *Bulldog Elec. Prod. Co.*, 106 F. Supp. 819, 870, and cases cited therein. But, to avoid infringement of a patent with even this narrow scope, the accused device must amount to more than merely a colorable departure from the invention. *Sanitary Refrigerator Co.* v. *Winters*, 280 U. S. 30.

The Harrington imitation of Long's improvements cannot escape the accusation of infringement even under this easy test. The attempt made to "get off" Long's patent by altering the extended horizontal run of the chain from a straight line to a zig-zag line constitutes no more than an ineffectual subterfuge, ineffectual to add any advantage over Long's improvement, ineffectual to prevent a clear reading of the device on Long's claim. The pivotal clips are virtually indistinguishable. The finding that Harrington infringed Long's patent on these devices is further bolstered by substantial evidence of Harrington's hiring Davis and other employees from Long.

The monopoly of a pioneer patent and the monopoly of an improvement patent are mutually exclusive. *Binney &*

Smith Co. v. *United Carbon Co.*, 125 F. 2d, 255. The making of patentable improvements does not avoid infringement. *Acme Steel Company* v. *Eastern Venetian Blind Company*, 130 F. Supp. 459. The improver is liable as an infringer if he appropriates the basic invention without license. *Temco Company* v. *Apco Company*, 275 U. S. 319. "Two patents may both be valid when the second is an improvement on the first, in which event, if the second includes the first, neither of the two patentees can lawfully use the invention of the other without the other's consent." *Cantrell* v. *Wallick*, 117 U. S., 689, 694, as quoted in *Wine Railway Appliance Co.* v. *Baltimore & O. R. Co.*, 78 F. 2d, 312, 316.

In accord with the foregoing opinion, the defendants Long Manufacturing Company, Long Tobacco Harvesting Company, and W. R. Long will be enjoined from committing further acts of infringement of Holliday's patent No. 2,672,248. Long Manufacturing Company, which produced the infringing harvesters, and Long Tobacco Harvesting Company, the sales outlet, will be liable for damages to compensate for the infringement, but in no event less than a reasonable royalty for the use made of the invention by these infringers. An accounting shall be made to aid in determining the amount of damages due.

It does not appear from the evidence that the defendant W. R. Long, though the principal owner of the defendant corporations, was merely using the corporations as a fraudulent cloak to carry on the infringement of other's patents; nor was his activity in connection with the plaintiff's patent carried on beyond the scope of his authority as a corporate officer. He is not personally liable to Harrington or Holliday for damages.

Similarly, Harrington Manufacturing Company, J. J. Harrington, and Jim Brown Holliday will be enjoined from committing further acts of infringement of Long's patent No. 2,704,158. Harrington Manufacturing Company will be liable for damages to compensate for the infringement, but in no event less than a reasonable royalty for the use made of the invention by this infringer. An accounting

shall be made to aid in determining the amount of these damages also.

J. J. Harrington is exempted from personal liability on the basis of his relationship with Harrington Manufacturing Company and with the infringement, which relationship I find to be parallel to that held by Long.

I find for neither plaintiff a flagrant, willful infringement that justifies increased damages. In addition to so finding, I deny increased damages as a matter of discretion.

Neither plaintiff may recover attorney fees.

Each party shall bear its own costs.

(S.) Don Gilliam,
United States District Judge.

* * * * * * * * * *

Memorandum by the Court and Order

Plaintiff, owner of a patent on a tobacco harvester, sues defendants for infringement and asks for an injunction and damages. Defendants move to dismiss under Rule 12(b) for failure to join an indispensable party, namely, Harrington Manufacturing Company, Inc., plaintiff's licensee.

By written instrument plaintiff granted to the Harrington Company for the life of the patent "exclusive rights to manufacture and sell" the patented article. The agreement stated that the parties "may at their option jointly enter suit against other parties believed to be infringing", that the expenses of and the recoveries in such suits shall be divided equally between them, and that they may jointly license others to use the patent for any purpose, with license fees or royalties to be shared equally.

An indispensable party is one who has an interest in the controversy of such a nature that a final decree cannot be made without either affecting that interest, or leaving the controversy in such a condition that its final termination may be wholly inconsistent with equity and good conscience. *Shields* v. *Barrow*, 58 U. S. 130, 139; *City of Orangeburg* v. *Southern Ry.*, 134 F. 2d 890, 893 (4th Cir.).

Application of this broad rule in this case must take into account the statutory basis of the action. Jurisdiction is founded on the patent laws, as revised in 1952. 35 U. S. C., Sec. 281, provides that: "A patentee shall have remedy by civil action for infringement of his patent . . .", and 49 U. S. C., Sec. 100, defines patentee as including "not only the patentee to whom the patent was issued but also the successors in title to the patentee."

Prior to 1952 the patent law authorized recovery of damages for the infringement of any patent "by action on the case, in the name of the party interested, either as patentee, assignee or grantee." 35 U. S. C. (1946 ed.) Sec. 67. Injunctions could be issued in proper cases. 35 U. S. C. (1946 ed.) Sec. 70.

The question of indispensable parties in patent litigation is not adequately and clearly settled. Some of the difficulty undoubtedly arises from the wide variety of agreements respecting patents and the absence of precise, commonly understood categorizations of "patentee", "assignee", "grantee", "exclusive licensee", "simple licensee", etc. In *Waterman* v. *MacKenzie*, 138 U. S. 252, 255, the Supreme Court set forth the basic divisions in the following language:

> "Every patent issued under the laws of the United States for an invention or discovery contains 'a grant to the patentee, his heirs and assigns, for the term of seventeen years, of the exclusive right to make, use and vend the invention or discovery throughout the United States and the Territories thereof.' . . . The monopoly thus granted is one entire thing, and cannot be divided into parts, except as authorized by those laws. The patentee or his assigns may, by instrument in writing, assign, grant and convey, either, 1st, the whole patent, comprising the exclusive right to make, use and vend the invention throughout the United States; or 2d, an undivided part or share of that exclusive right; or 3d, the exclusive right under the patent within and throughout a specified part of the United States. . . . A transfer of either of these three kinds of interests in an assignment, properly speaking,

and vests in the assignee a title in so much of the patent itself, with a right to sue infringers; in the second case, jointly with the assignor; in the first and third cases, in the name of the assignee alone. Any assignment of transfer, short of one of these, is a mere license, giving the licensee no title in the patent, and no right to sue at law in his own name for an infringement. . . . In equity, as at law, when the transfer amounts to a license only, the title remains in the owner of the patent; and suit must be brought in his name. . . . Any rights of the licensee must be enforced through or in the name of the owner of the patent, and perhaps, if necessary to protect the rights of all parties, joining the licensee with him as a plaintiff." Accord: *United States* v. *General Electric Company*, 272 U. S. 476, 489.

Of course, whether a transfer is an assignment or a license does not depend on the name given to it by the parties, but on the legal effect of the provisions of the agreement. *Waterman* v. *MacKenzie, supra; Hook* v. *Hook and Ackerman*, 187 F. 2d 52. In the *Waterman* case, as in this case, the patent owner granted an exclusive license to make and sell the invention, but since the right to use was not specifically included, the transfer is a license, not an assignment.

Certain principles with respect to parties in patent cases have become established. The owner of the patent, or his assignee as defined in the *Waterman* case, is an indispensable party in a patent infringement suit, *Independent Wireless Telegraph Co.* v. *Radio Corporation of America*, 269 U. S. 459; and where two or more persons own undivided interests in the whole patent, all are indispensable parties. *Hurd* v. *Sheffield Steel Corp.*, 181 F. 2d 269.

An exclusive licensee, that is, a person who has the right to practice the invention and the owner's promise that others shall be excluded, cannot sue in his own name alone but must bring the action in the name of the owner. *Independent Wireless Telegraph Co.* v. *Radio Corporation of America, supra.* If the owner refuses to institute suit

or join therein, the exclusive licensee may make him an involuntary plaintiff, *Paul E. Hawkinson Co.* v. *Carnell*, 112 F. 2d 396, or a defendant, *Dietel* v. *Chisholm*, 42 F. 2d 172; *Radio Corporation of America* v. *Emerson*, 296 Fed. 51.

On the other hand, a simple, bare or non-exclusive licensee, that is, one who has only the right to practice the invention along with the patentee and other licensees, cannot bring suit for infringement and is not a necessary or proper party in such a suit. *Western Electric Co.* v. *Pacent Reproducer Corp.*, 42 F. 2d 116; *Blair* v. *Lippincott Glass Co.*, 52 Fed. 226.

An exclusive licensee is clearly a proper party in a suit brought by the patent owner asking for equitable relief against infringement in the licensee's territory or field of use, *Birdsell* v. *Shallol*, 112 U. S. 485; *Jeoffroy Manufacturing, Inc.* v. *Graham*, 206 F. 2d 772; *P. S. Mallory & Company* v. *Automotive Manufacturers Outlet, Inc.*, 45 F. 2d 810; *Western Electric Company* v. *Pacent Reproducer Corp., supra; Radio Corporation of America* v. *Emerson, supra; Bowers* v. *Atlantic, Gulf & Pacific Co.*, 162 Fed. 895; and such licensee may intervene as plaintiff. *Innis Spelden & Co.* v. *Food Machinery Corp.*, 2 F. R. D. 261.

As to whether the exclusive licensee is a necessary or indispensable party, there is a difference of opinion. In the question from *Waterman* v. *MacKenzie*, above, the Court said that perhaps, if necessary to protect the rights of all parties, the licensee should be joined. In *Birdsell* v. *Shallol*, 112 U. S. 485, 486, the Court stated:

> "... a suit in equity may be brought by the patentee and the licensee together. . . . In a suit in equity brought by the patentee alone, if the defendant occasionally objected to the non-joinder of the licensee, the Court might, as Judge Lowell did in *Hammond* v. *Hunt*, 4 Ban. & A. 111, order him to be joined."

Speaking for the Court in *Independent Wireless Telegraph Co.* v. *Radio Corporation of America*, Chief Justice

Taft said: "Indeed, both the owner and the exclusive licensee are generally necessary parties in the action in equity." 269 U. S. 459, 466.

In the lower federal courts *P. S. Mallory & Co.* v. *Automotive Manufacturers Outlet*, 45 F. 2d 810, 813; *Arey* v. *Goodyear Tire & Rubber Co.*, 11 F. R. D. 209; *Chisholm, et al.* v. *Johnson*, 106 Fed. 191, 212; *R. E. Dietz Co.* v. *C. T. Ham Manufacturing Co.*, 47 Fed. 320; *Hammond* v. *Hunt*, Fed. Cas. No. 6,003, hold or assert that an exclusive licensee is in at least some infringement cases an indispensable party, while the opposite view is expressed in *Bakelite Corp.* v. *Lubri-Zol Development Corp.*, 34 F. Supp. 142; *Bowers* v. *Atlantic, Gulf & Pacific Co.*, 162 Fed. 895; *Comptograph Co.* v. *Universal Accountant Machine Co.*, 142 Fed. 539, *reversed on other grounds*, 146 Fed. 981; *Frankfort Whisky Process Co.* v. *Pepper*, 26 Fed. 336; *Nellis* v. *Pennock Manufacturing Co.*, 13 Fed. 451.

In my opinion, the sounder rule is that an exclusive licensee who falls outside the definition of an assignee in *Waterman* v. *MacKenzie* is not an indispensable party plaintiff in an infringement suit brought by the patent owner. The 1952 change in the statute, stressing as it does the right of the patentee as holder of the legal title to bring a civil action for infringement, adds weight to this conclusion.

If suit is brought by the exclusive licensee in the name of the patentee, or by the patentee with the exclusive licensee's consent and concurrence, the exclusive licensee is in effect a party, and the Supreme Court has expressed doubt that after judgment he would be permitted to bring a new suit against the same defendant for the same infringement. *Birdsell* v. *Shallol*, 112 U. S. 485, 487.

Since he is a proper party, the exclusive licensee may in most cases intervene to protect his rights or may be brought in by the Court, and even though he takes no part in a suit for an injunction he is adequately represented by the patentee, who holds the title to the patent in trust for him. *Independent Wireless Telegraph Co.* v. *Radio*

Corporation of America, 269 U. S. 459, 469. Where the exclusive licensee is not a formal or real party in an action for damages, the damages recoverable would be limited to those of the patentee alone. *Bakelite Corp.* v. *Lubri-Zol Development Corp.*, 34 F. Supp. 142.

In short, the right of action for infringement is given by statute to the owner of the monopoly, and an infringement suit brought by him may, without joinder of his exclusive licensee, proceed to final judgment, consistent with equity and good conscience. The motion to dismiss for failure to join an indispensable party is denied.

From what has been said, it is manifest that in this, as in many other cases, the exclusive licensee has an interest in the outcome of the litigation and should be joined in order to bring all proper parties before the Court. The agreement between plaintiff and Harrington Manufacturing Company gives the latter the exclusive right to manufacture and sell the tobacco harvester, and defendants' alleged infringement consists of manufacturing and selling. If Harrington is not joined in this suit and plaintiff here recovers against defendants for infringing the patent, defendants may be subjected to a subsequent action by Harrington Manufacturing Company seeking recovery of its damages for the same infringement. In addition, if the validity of the patent is brought into question, the Harrington Company as exclusive licensee should be in a position to assist in its defense.

Rule 19(b) says that: "When persons who are not indispensable, but who ought to be parties if complete relief is to be accorded between those already parties, have not been made parties and are subject to the jurisdiction of the Court as to both service of process and venue and can be made parties without depriving the Court of jurisdiction of the parties before it, the Court shall order them summoned to appear in the action." Harrington Manufacturing Company, Inc. ought to be a party to this suit in order to accord complete relief between the present parties, it is subject to the jurisdiction of the Court as to both service

of process and venue and it can be made a party without depriving the Court of jurisdiction of the existing parties.

Therefore, pursuant to Rule 19(b), it is ordered that the Clerk issue summons to Harrington Manufacturing Company to appear as a party and assert such claims as it may have in the subject matter of the action; and that Harrington Manufacturing Company have thirty days after service of summons and copy of this order within which to plead.

DON GILLIAM,
United States District Judge.

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(Filed December 17, 1956)

Judgment in Civil Action 340

This suit came on for trial to the Court on May 14, 1956, the parties appearing in person and by counsel of record. The taking of testimony was concluded on May 16, 1956, and the matter was submitted on briefs. The Court, having read and considered the proceedings, evidence and briefs, prepared and filed a written memorandum opinion on November 30, 1956. This opinion holds that the United States Letters Patent No. 2,672,248, issued March 16, 1954, to Jim Brown Holliday, and exclusively licensed to Harrington Manufacturing Company, Incorporated, is a valid, pioneer, patent; that it has been and is being infringed by the defendants Long Manufacturing Company, Inc., and Long Tobacco Harvesting Company, Inc.; that said infringement should be enjoined; that there should be an accounting to determine the amount of damages the plaintiffs have suffered; that there should be no increased damages; that plaintiffs should not recover attorneys' fees; and that each party should bear its own costs.

It is now ordered, adjudged and decreed as follows:

1. That Jim Brown Holliday was the true, first and original inventor and discoverer of the invention described in United States Letters Patent No. 2,672,248, and partic-

ularly described in claim 7 thereof, that Harrington Manufacturnig Company, Incorporated, is the exclusive licensee thereunder, and that Jim Brown Holliday and Harrington Manufacturing Company, Incorporated, between them, are the owners of said patent and all rights and privileges in connection therewith, and all claims and demands arising out of the infringement complained of herein.

2. That said Letters Patent No. 2,672,248, together with claim 7 thereof, is a valid, pioneer, patent.

3. That the defendants Long Manufacturing Company, Inc., and Long Tobacco Harvesting Company, Inc., have been infringing and are continuing to infringe said patent and claim 7 thereof by the manufacture, sale and distribution of their raised platform tobacco harvesters.

4. That a perpetual writ of injunction shall issue and hereby is issued aganist the defendants, and each of them, and their employees, agents, associates, and representatives, strictly commanding and enjoining them, and each of them, from manufacturing, selling, distributing, or otherwise handling or disposing of said raised platform tobacco harvesters or any other device or article embodying the invention covered by claim 7 of said Letters Patent No. 2,672,248, as construed in the memorandum opinion filed by the Court herein.

5. That in the event the parties hereto are unable to agree upon the amount of damages to which plaintiffs are entitled, an accounting shall be made and the results thereof submitted to this Court as an aid in determining the amount of damages due, which is to be not less than a reasonable royalty.

6. That no punative damages, attorneys' fees or costs shall be awarded.

DON GILLIAM,
United States District Judge.

* * * * * * * * * *

Tihs suit came on for trial to the Court on May 14, 1956, the parties appearing in person and by counsel of record. The taking of testimony was concluded on May 16, and the matter was submitted on briefs. The Court, having read and considered the proceedings, evidence and briefs, prepared and filed a written memorandum opinion on November 30, 1956. This opinion holds that United States Letters Patent No. 2,704,158, when issued March 15, 1955, to plaintiff, Long Manufacturing Company, Inc., assignee of the inventor, William R. Long, is a valid patent; and that it has been and is being infringed by the defendants Harrington Manufacturing Company, Inc., J. J. Harrington and Jim Brown Holliday; that said infringement should be enjoined; that there should be an accounting to determine the amount of damages that plaintiff has suffered; that there should be no increased damages; that plaintiff should not recover attorneys' fees; and that each party should bear its own costs.

It is now ordered, adjudged and decreed as follows:

1. That William R. Long was the true, first and original inventor and discoverer of the invention described in United States Letters Patent No. 2,704,158, of which patent Long Manufacturing Company, Inc., the plaintiff, is the assignee.

2. That said Letters Patent No. 2,704,158 is valid

3. That the defendants Harrington Manufacturing Company, Inc., J. J. Harrington, and Jim Brown Holliday have been infringing and are continuing to infringe said patent by the manufacture, sale and distribution of tobacco harvesters.

4. That a perpetual writ of injunction shall issue and each of them, and their employees, agents, associates, and representatives, strictly commanding and enjoining them, and each of them, from manufacturing, selling, distributing, or otherwise handling or disposing of tobacco harvesters or any other device or article embodying the

invention described in said Letters Patent No. 2,704,158, as construed in the memorandum opinion filed by the Court herein.

5. Plaintiff is entitled to recover damages from defendant Harrington Manufacturing Company, Inc., for infringement of the Long patent in suit. That in the event the parties herein are unable to agree upon the amount of damages to which plaintiff is entitled, an accounting shall be made and the results thereof submitted to this Court as an aid in determining the amount of damages due, which is to be not less than a reasonable royalty.

6. That no punitive damages, attorneys' fees or costs shall be awarded.

DON GILLIAM,
United States District Judge.

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4 **Jim Brown Holliday.**

Q. State your full name. A. Jim Brown Holliday.

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A. I am working as part owner in a little manufacturing company, also engaged in farming and possibly working in some mechanic work on my own.

Q. How long have you been engaged in farming? A. Started in the spring of 1946.

Q. What kind of farming? A. Diversified, including tobacco, soy beans, cotton, corn.

Q. Are you the J. Brown Holliday, the inventor in patent 2672248 of which I hand you a copy? Are you the inventor of what is described in that? A. No answer.

5 Q. Are you the patentee of what is described in there? A. Yes, sir.

Q. When did you first get the idea for this device described in this patent? A. I started thinking about this particular idea in 1946 and possibly the idea of the high clearance machine came from some army experience.

The Court: What do you mean by high clearance?
A. This high clearance tobacco harvester, something to go over the top of the tobacco stalks.

By Mr. Davis:

Q. This machine is a high clearance machine? A. Yes, sir.

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Q. When did you first do any building on such machine? A. Started building on that in 1952.

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7 Q. What did you do with it after you took it out? A. That particular year we had a tremendous insect infestation and we carried it home——

Q. Where is home? A. Jamesville, North Carolina, and mounted a sprayer on it. We used it as a highboy sprayer.

Q. Why did you put these upright parts on it? A. I was intending to put the conveyor chains on hoping to use the machine in 1952 as a tobacco harvester.

8 Q. Did you use it in 1952 as a tobacco harvester? A. Very limited amount.

Q. Explain that? A. Approximately the second week in July after we finished our spraying and topping of tobacco I placed one chain on one of the conveyors and didn't have drive means and used a crank at the top and at that particular time I had put two seats on the machine, two outside seats. They were used to stand on in topping tobacco and succoring tobacco. Used Dixie Bright No. 1 that year and used the machine to succor. I put one chain to crank. At the time we made about three trial runs priming and sending tobacco up the chain. Didn't have complete platform. Used partial platform for work to stand on in priming and taking tobacco up. The experiment was somewhere the first two weeks possibly in July.

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Q. At that time did you have more than one seat on the machine? A. Two seats.

Q. Were they adjustable? A. Yes, sir.

Q. How? A. Two bolts in each bracket that came from the seat and the bolts came through a series of holes, fit in two of the holes in moving it up and down.

Q. Did this machine work when you took it out and tried it? A. Yes, sir.

Q. That was in 1952? A. Yes, sir, about the middle of July or before.

Q. Did anybody see this operation in 1952? A. Yes, sir, there were several gentlemen who witnessed it.

Q. What did you do subsequent to that time with the machine? A. The first experiment we did in the back yard at my home in Jamesville. I wanted to check the speed, so many clips to so many lineal feet to get the right number of feet. Our tobacco was set twenty-one inches to the drill. I put a white mark on one of the back wheels. I marked the ground off every twenty-one inches and while one would turn the crank to count the revolutions the other would count the revolutions of the back wheel and by that we got pretty close to hitting the ratio of ground traveled and the amount of tobacco a person would pull in process of housing tobacco with the machine.

Q. In that test you made did somebody ride on one of those seats? A. Yes, sir.

Q. And did the person riding on that seat put it on the chain? A. In that demonstration some of the boys went through our garden and stripped our collard leaves. Some of them put dog fennel in the chain and sent those up. Others put sticks and most anything to simulate pulling tobacco.

Q. You didn't actually pull real tobacco? A. No, sir.

Q. Following that, these experiments made in the summer of 1952, what was the next work done on the machine? A. In just a couple or three days, possibly within a week we took the machine and carried it to the tobacco field, put it in a row, and more or less repeated the process. At that time we were pretty sure of our ratio. I speak of "we".

That is the family and boys on the farm helping me. Was pretty sure of the amount of wheel turns, what ratio, but I wanted to be absolutely positive before going to the expense and trouble of hooking up the drive. Took it to the field and this was one of the first pulling of tobacco. Actually pulled tobacco, placed it in the clip, the person on the top turned the crank at intervals. As it came up he took it and laid it on the platform.

Q. Then what happened? A. My wife and I, right much later we had gotten to about the top of the stalk in the tobacco, next to the last pulling. I wanted to more or less check to see if any difference in pulling tobacco low at the ground and high on the stalk. I took the machine in the field and had a nine year old boy driving for us and my wife and I went through the process again by taking the stalk up.

11 Q. That was by manual turning? A. Yes, sir.

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12 As soon as we had finished the conveyor chains and extended those we went to work and put a top on the machine. We used a wooden frame for the burlap top, or bag top, fertilizer bags split open and sewed together to make a shade canvas. We had made a few trial runs during the time we were putting the top on with weeds and what have you to try to adjust the primers. On the 3 day of July, 1953 we started to work with the machine as a complete unit, nine individual operators, four brakers, four loopers and one driver.

Q. How many up and down chains on the machine at that time? A. All four.

Q. Were they driven mechanically? A. Yes, sir.

Q. All four of them? A. Yes, sir.

Q. How? A. From the rear wheel through a series of shafts.

13 Q. As shown in the patent? A. Yes, sir.

Q. This date you gave for operating, July 3, 1953,

was that your first full operation of the complete machine? A. Yes, sir.

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15 Q. In the course of harvesting this tobacco with this machine were these seats that carry the people, as shown on photograph Exhibit 2, was it necessary to adjust those up and down? A. Yes, sir.

Q. Approximately how far up and down did you adjust them? A. From about eight inches of the ground to about thirty inches.

Q. Is it important, that business of adjusting these seats up and down? A. Yes, sir.

Q. Why is that necessary? A. Tobacco ripens from the bottom of the stalk and you start pulling the bottom leaves, two or three leaves at the time, and our tobacco now growing six and seven feet tall, so they have to be ad-
16 justed to reach the height of tobacco being pulled at the particular time.

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Q. Subsequent to your use of the machine in July, 1953 what did you do with the machine? What was your
17 next activity with the machine? A. Sir, I contacted several different manufacturers that I thought possibly might be interested in building the machine, one of whom included of course Mr. Harrington.

Q. When did you contact him? A. I don't know but sometime I would say in the late fall, October, November or December.

Q. What was the result of your contact with Mr. Harrington? A. He advised me to organize my own selling organization and he would be glad to build the machine. That was about the extent of our work at that time together.

Q. Did you ultimately work further with Mr. Harrington? A. Yes, sir, in the spring of 1954. In February, I believe, Mr. Harrington contacted me and later on during

that year we got our contracts right and I went to work with Mr. Harrington to develop the machine.

Q. Does that arrangement with Mr. Harrington, or Harrington Manufacturing Company, still exist? A. Yes, sir.

Q. An under that arrangement is there a device on the market today? A. Yes, sir.

Q. What is it? A. Roanoke-Holliday.

18 Q. Is that licensed under your patent? A. Yes, sir.

Q. Do you have any idea approximately how many of those have been sold? A. Up until the end of last year approximately eleven hundred. I don't have the figures for this year.

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22 Cross-examination of Mr. Jim Brown Holliday.

By Mr. Dowell, Sr.:

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23 Q. You spoke of having a harvester in 1952. Actually you did some dusting in 1952? A. Yes, sir.

Q. You built the machine to do dusting and spraying? A. I built the machine for a tobacco harvester. If I had built a duster it wouldn't have been the same machine. I did dusting and spraying with the machine but I didn't build it for that purpose.

24 Q. You say you didn't have any chains on it as shown on the patent. You went through and described a number of things you didn't have on the first machine. A. That is correct.

Q. But it was a high clearance machine? A. Yes, sir.

Q. There were a number of high clearance machines on the market at that time? A. Yes, sir.

Q. Did you purchase one of those? A. No, I didn't.

Q. There were tobacco harvesters on the market at that time? A. Not that I know of. I had only seen one machine. I hadn't seen that but a picture of the Alphin, or however it is pronounced. Ford made the machine. I saw that in the paper sometime in the summer of '52.

Q. Have you seen one of those harvesters? A. I have seen one since. I hadn't seen it then but a picture in July or August of '52.

Q. I am looking at a catalog that advertises high clearance duster by Hagan Manufacturing Company. Did you know about that in '52? A. I didn't know about that particular one but I knew of dusters.

Q. Dusters of that general type? A. Yes, sir.

25 Mr. Dowell: I would like to take this page out of the catalog to illustrate.

Long introduced page 274 of "Farm Implement News" and same is marked "Long 2".

Long introduces page 43 of the "Bright Leaf" publication, and same is marked "Long 3."

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26 Q. When did you first hear of the Long harvester? A. The week before his public demonstration, which was the 7 day of September, 1953. I believe the 7 of September came on Monday possibly and I heard of it the week prior to that.

Q. What was the occasion of your hearing about it the week prior? A. I believe possibly a newspaper advertisement maybe on the Saturday before and on Friday before I believe I saw a letter addressed to dealers concerning it.

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28 Q. Did you ever obtain any photographs of the Long harvester? A. Yes, I did.

Q. Explain how and the circumstances? A. There was an employee of Mr. Long that came to see me some time in October and I visited Mr. Long's plant after the demonstration and those photographs were given to me by him. The one photograph.

Q. What was that photograph? A. Picture of the machine inside of the building.

29 Q. What time was that trip made? A. I don't know exactly but quite some time after Mr. Long's demonstration. I would say three to four weeks.

Q. That would make it September. A. No, in October if four. If three weeks September.

Q. Latter part of September or early part of October? A. Yes, sir.

Q. You only got one photograph? A. I think that's right.

Q. Is that person who gave you those photographs still employed by Mr. Long? A. I understand not.

Q. Did you know what he was doing when he gave you the photographs? A. No. I had never seen him before that particular day or that night.

Q. But you accepted the photograph? A. Yes, sir.

The Court: Where were you when you got it?

A. At Mr. Long's plant.

By Mr. Dowell:

Q. Did you say he came to you? A. Yes, sir. I won't at home and he left word for me to come by and see him and I did.

Q. He left a message at your home for you to come by the plant? A. Yes, sir.

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30 Q. Who was the man who gave you the photo-
graph at the plant? A. William Edwin Davis, I
31 believe.

Q. Did you know Mr. Davis before he approached you? A. Never had seen him before.

Q. Was he the same W. E. Davis, William Edwin Davis, who obtained Patent 2715698 on August 23, 1955? A. I don't remember the dates or numbers. The machine looks familiar.

Q. I show you the aptent I just mentioned. A. I would say yes.

Q. What was Mr. Davis' work with Long? A. I definitely wouldn't say I know it. I was led to believe he was possibly a draftsman or engineer.

Q. It was your impression he was working with Long as a draftsman or engnieer? A. Yes, sir.

Q. What was the purpose of his giving you the photograph of the Long Machine? A. I really don't know. I can explain it as he explained it to me. He explained to me, in fact that particular night I went by his room, he was rooming in Tarboro, and he showed me some patent applications. What the dates were I don't know but I know they pertained to harvesting equipment. Actually at the time it was the first patent application I had seen. It wasn't too impressive to me. It seems Mr. Davis at that time felt I needed a little help and anything that fell to my line to take I took it and where it didn't so far as
32 honesty is concerned I discounted it. Mr. Davis and I have been on friendly terms since and we have had quite a few conversations concerning patent matters. At that time anybody who knew anything about patents it was more than I knew because it was my first episode in such affairs.

Q. Is Mr. Davis still a good friend of yours? A. I wouldn't say a good friend. Still on bargaining terms. There is no animosity.

Q. Ever had any conflict with him on tobacco harvesters? A. Yes, sir. Some matters straightened up in Washington since then.

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36 Q. Do those photographs represent this machine? A. They are photographs of a portion of the '53 machine. This machine last year was not used in housing tobacco. This is '55. We had one of the Harrington machines. That was used with a duster on the back of it last year. It didn't have the seats on because we stripped them down.

Long introduces in evidence photograph marked "Long 5". This is the 1953 machine. It has been stripped down to do dusting with in '55. Not used to house tobacco. Was used in '54. Doesn't have the seats on it. Of course canopy on top. Doesn't have drive chain for the conveyor chain.

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Q. You didn't want to wait to see if it would sell? A. No, I didn't think I would have to wait for that because possibly several thousand people visited my field in '53. Several asked me to stop and build the machine but I was harvesting the crop in '53 and didn't have time.

Q. Thousands visited your place? A. Yes, sir. At one point had to hire help to keep people out of my tobacco patch. They were destroying it.

Q. When was this? A. July, '53.

Q. When in July? A. From approximately the 20th on to the first of August possibly.

. . . . . .

Q. Referring to your machine, it wasn't the fact that it was a tall machine or a machine that would move over plants like tobacco plants without injuring them that you would consider the novelty of it? A. No, sir. The part I considered the novelty was possibly the method of getting tobacco on top of it.

Q. I show you a catalog of implements, December 22, 1951 and ask you to look at the lower half of page 72 where there appears an advertisement of a farm tractor mounted sprayer, the upper left corner of page 172 where it shows chrome power sprayer, and also I ask you to refer to page 243 under the title "Grain Detasseler for Hybrid Grain", first column where it mentions Bolinger Brothers, Finch, Incorporated, and Hagie Manufacturing Company, those particular machines you say you knew about when you started to work on yours. You said you were familiar with those machines at the time? A. I had never seen one of these. I think I had seen this machine advertised on page 72. I am not positive of the date of that.

Q. Didn't you testify earlier that you knew there were such machines on the market at that time? A. I am pretty sure. Yes, they had been advertised. Possibly I did.

Long introduces in evidence catalog "Implements Directory", marked "Long 12".

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Q. You mentioned an Alphin patent? A. I didn't mention the patent. I mentioned the advertisement I saw in a paper either in July or August, 1952.

Q. Did you see the Alphin harvester at the State Fair in '52? A. I didn't attend the State Fair in 1952.

Q. You saw an advertisement of the Alphin harvester.

A. I think so.

46 Q. I ask you if that advertisement is like that patent I just handed you, patent No. 2,702,134 of February 15, 1955 filed the 29 of July, 1952? A. It resembles it quite a bit.

Q. Is it the same thing? A. Yes, sir.

Q. Your statement you had never heard of a tobacco harvester and the fact that you just said you saw one advertised doesn't seem to be quite consistent. A. I said I never heard of one before I started building mine and this happened to be in the summer of '52 and at that time I did hear of one but not before then.

Long introduces in evidence the Alphin patent No. 2,702,134 and same is marked "Long 13".

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47 Q. Will you refer to the last patent, the Jones patent entitled "Tobacco Elevator", and also the first patent in the booklet, and the second patent, which are also vertical conveyors? Look at sheet 2 on the left hand side and in the next patent we likewise have a vertical conveyor with clips on it. You don't consider vertical conveyors the principal feature of your invention? A. Sir, at that particular time that was a problem, to get tobacco on top of the stalk. I consider it one of the principal features.

Q. At that time also you considered it necessary to have beveled gears? A. It seemed to at that time, yes, sir.

Q. When did you change from the vertical to the more

or less transitory or longitudinal position conveyor instead of upright? A. 1954.

Q. When in 1954? A. During the months of March and June I would say, including June.

Q. That was after you knew about the Long har-
48 vester? A. Yes, sir.

The Court: Explain to me what was the change. A. The loopers only had a short distance to take the tobacco out of the chains and the chains going straight up. They had to have more room. We knew that the first year's operation but the loopers required more room to take that tobacco off.

Q. Then what did you do? A. Extended them horizontally along the machine and back down to the bottom of the ground again.

By Mr. Dowell:

Q. You first had them vertically as shown in the patent and no disclosure in the patent other than vertically? A. No, sir.

Q. Then you made them to extend longitudinal so as to have more time to take it off of the stick? A. Yes, sir.

Long introduces three photographs which are marked "Long 15", "Long 16", and "Long 17".

Q. 15 is the complete one. 16 shows the convex clip and the next one clip suspended in front of a picket fence. Referring to this photograph that says "John Dere", which is "Long 15", I notice you have a portion at the top that extends lengthwise of the vehicle. When did you make a harvester like that? A. In the spring of '54, some time after March.

Q. And when did you make the clip so it would
49 swing like a pendulum as shown in No. 17? A. In the same category of time. I don't remember exactly.

Q. Spring of 1954? A. Yes, sir.

* * * * * * * * * *

50 Q. You identified 15, 16 and 17 as being manufactured by Roanoke-Holliday. A. Yes, sir, in 1954.

Q. Since you don't seem to have illustration of the machine you are now selling I have photographs which I would like for you to identify and if you can we would like to offer them in evidence. Do you recognize this? A. This was the machine manufactured in the early part of '55. I don't know the exact date but we made changes later and this was one of the first machines manufactured in '55.

Q. It is a '55 model? A. Yes, sir.

Long introduces in evidence photographs marked as Long Exhibits 18 to 23 inclusive.

Q. You have Exhibit 18. That is the patent number of your patent in suit, is that correct? A. Yes, sir.

Q. On Exhibit 19 we have a spring clip that is swung like a pendulum? A. Yes, sir.

Q. Holes spaced along the length of the chain so it can be adjusted longitudinally? A. Yes, sir.

Q. And looking at at least three of these photographs there are portions of the chain extending longi-
51 tudinal of the vehicle? A. That is correct.

Q. You mentioned the fact that this one photograph was given to you by Mr. Davis? A. That's right.

Q. What was the reason he gave this photograph to you? Did he say or do you know? A. No, I don't recall why he gave it to me other than I do remember I would have like to have such a photograph but I don't remember under what circumstances he gave it to me.

Q. He afterward went to work with you? A. No, went to work with Harrington Manufacturing Company.

Q. Went to work on the machine you were interested in selling? A. Yes, sir.

Q. What was that arrangement? A. I don't know. I think it was the year 1955 he went to work with Mr. Harrington. I think you would have to ask him what arrangement. I had licensed Mr. Harrington in my patent. I worked with him the first year to help design the harvester. In 1955 I worked on sales mostly and also helped do some design work in '55.

. . . . . .

52 Q. So both you and Mr. Davis worked for Harrington after Mr. Davis worked for Mr. Long, and you don't know the connection and how Mr. Davis gave you the photograph of the Long harvester? A. Yes, sir.

The Court: Can you remember anything he said to you? A. Your Honor, I wasn't too interested. I know Mr. Davis evidently was disappointed because he did take me to show me the machine he said was his machine he was building himself. I remember that night it had a chain hoister. There was no front end in the Davis machine, or referred to as the Davis machine. I remember we took some odds of paper and stuck it in. I didn't pay too much
53 attention. I was there a brief time. It seemed to me the machine was pretty well complete except the front end.

Q. Do you remember what he said when he gave you the photograph? A. The only thing I remember along that line he said the reason he wanted me to go up there was to talk. He was more or less a country boy, in my category. Any information was welcome. I didn't know anything about patent work. I think I had contacted my patent lawyers once by letter and had been to see them one time. I don't remember much about the conversation other than he appeared to be on the up and up so far as I was concerned, and I don't remember whether I asked for the picture, or asked if he had a photograph of the Long machine. I was placed in a rather precarious position at the time. I don't remember too much of the conversation only it was a friendly meeting and so far as I knew Mr. Davis did have access to the pictures. I did know he worked in the office but I didn't know in what capacity except his own statement.

By Mr. Dowell:

Q. You did feel you were in a precarious position? A. At that time I was because I had a product I thought belonged to me and had offered it to a couple of manufacturers who were not interested and it left me rather flat.

Q. Did you offer it to Mr. Long? A. No, sir. I never contacted Mr. Long until later.

Q. You knew he was manufatcuring farm machinery? A. Yes, sir, and at that time was also manufatcuring a tobacco harvester.

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59 Redirect examination of Mr. Jim Brown Holliday:

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62 Q. You fix your date of your first conversation with Mr. W. E. Davis as sometime in the fall of 1953. How closely can you fix that date? A. It would be the last few days of September or first few days of October.

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A. I would say a couple of weeks.

Q. Was it subsequent to or before the Long machine was publicly demonstrated? A. It was afterward.

Q. And that was on? A. September 7.

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63 Q. The Long machine was publicly demonstrated September 7, 1953. Was the Long machine thereafter on public demonstration or public advertisement immediately or did some time elapse before the Long machine was shown publicly? A. It was shown the week of the State Fair and that was some time in October. I am not positive of that date but it seems like starting with the 18 of October that year or in that category.

Q. I show you a newspaper, "The News & Observer", Raleigh, North Carolina, Saturday morning, September 5, 1953, and note that on page 3 an advertisement apparently from Long Manufacturing Company. I ask you if that is the Long harvester as you knew it at that time? A. I never did see the Long harvester until after his demonstration.

Q. You hadn't seen it September 3? A. No, sir. I do know at the State Fair the machine had a changed appearance overall. I think I saw it in front of Mr. Long's

64 plant between his demonstration period and Fair time. I was selling tobacco in Rocky Mount and I saw the machine in passing.

Issue of "The News & Observer" dated September 5, 1953 introduced by Holliday and marked "Holliday 8".

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75 **Joseph Julian Harrington,**

being sworn, testified as follows:

Direct examination.

By Mr. Davis:

Q. You are Mr. Joseph Julian Harrington? A. Yes, sir.

Q. What is your business? A. Manufacturer of farm implements.

Q. Where is your business located? A. Lewiston, North Carolina.

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76 Q. What position do you hold with the company? A. President.

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Q. When did you first become acquainted with the Holliday tobacco harvester? A. Mr. Holliday and his brother Leonard came to see me I would say the last of October or possibly November, 1953. They came to see me to try to get us to make his tobacco harvester. At that time we were experimenting with a cotton picker. I told Mr. Holliday we couldn't help him at that time but I would suggest to him that he go back to Jamesville, organize his own sale force and we would be glad to build the harvester for him but he would have to sell and promote his harvester.

77 Mr. Holliday left and we had telephone calls between us once or twice that didn't amount to too much. I don't remember the exact details of it but kept in touch in a very light fashion until some time in February I went back to see Mr. Holliday. Our cotton stripper un-

fortunately had not proven too successful. I went to see Mr. Holliday and looked at his machine and we eventually got together. After his patent was granted we got together so Harrington Manufacturing Company could pay him a fair royalty and manufacture the machines.

Q. Can you fix the date of the agreement? But that is in the record. When you undertook to produce the machine you apparently didn't produce it as Mr. Holliday had constructed the original? A. That is true.

Q. What did you have to do to decide which change to make? A. We decided it ought to have more room when tobacco reached the top platform, when loopers took tobacco from the clip, more working space for looper to take tobacco from the chains, therefore we lengthened the chain out on top of the platform. That is about the biggest change we had.

Q. I will show you an exhibit which is marked "Long 22" and ask you if this shows about the configuration you gave the chain in designing or re-designing the Holliday machine for commercial production? A. Yes, sir, that is approximate for '54. This is a '55 machine. In '54 was the same principle.

78 The Court: What change did you make then?

A. In '54 the conveyor chains were powered by the rear wheels. In '55 we went over from the rear wheel drive to the shaft flexible cable to drive direct from the motor. That is the biggest difference.

By Mr. Davis:

Q. I notice in Long 22 there appeared to be swinging clips. Were those in the first commercial model you made of the Holliday machine? A. Yes, sir.

Q. How did they get there? A. That was a necessary for the clips to be on the swinging top.

Q. Why? A. So when tobacco comes up and hits horibontal plane it will stay level for the looper to take it off. Mr. Holliday's first one was riveted tightly to the chain and when it came up it would flip over.

Q. Who made the changes? A. We made our changes at our plant.

Q. Who individually? A. My engineers and with the help of Mr. Holliday.

Q. Subsequent to the issuance of the Long patent you made another change in this device and I hand you a small Roanoke-Holliday advertisement and ask if it shows this other change you made? A. Yes, sir.

79 Q. Tell us what that is. A. That is what we call a delayed action. We found in '54 one of the complaints from the loopers was that the tobacco when it goes to the top platform it took at that time right swift loopers to grasp the tobacco before it had left the horizontal plane and started down. We found as long as you could let the tobacco stay in front of the looper that naturally gave the looper more time.

The Court: You just lengthened the chain?

A. Yes, sir, made it travel the same distance but over a longer route.

By Mr. Davis:

Q. With this machine does the looper get all the tobacco from the machine? A. No, sir, if she is right——

Q. She can get it as it goes to the top? A. Yes, sir, that is the most convenient place, or he might immediately grasp as it came by.

Q. Did you find the new arrangement on top had any advantage besides giving loopers more time to unload? A. Yes, sir, one more distinct advantage. The way we had it in '54 and a few in '55 without these idlers you have to keep the chain tight and you take tobacco out you have trouble of pulling the chain off of the sprockets. By tightening the sprockets that gave us more control of the chain which means the looper at all times had the opportunity to pull against it.

80 Holliday introduces in evidence advertisement of Roanoke-Holliday harvester and same is marked "Holliday 9"

Q. Give the date of that? A. It was after March 15. Around the 20 or 25 of March.

Q. Let's go back to the chain run. When you made this change in the chain run did you continue to pay Mr. Holliday a royalty on this device? A. Yes, sir.

Q. Without objection?

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Q. At the time you put the pivotal clips on did you pay Mr. Holliday royalty? A. Yes, sir.

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Q. At the time you made this change in the upper end of the chain and put the extra sprockets on by that
81 time the Long patent had issued? A. Yes, sir.

Q. Did that have anything to do with your making this change? A. That did have something to do with us making the change. When the Long patent issued March, 1955 naturally we had one sent to us and read it. We didn't know too much about a patent but we could see there was a possibility we were on Mr. Long's patent on the horizontal run. I got my board in discussion and told them if we were on his patent we ought to get off and then we went through our '54 experiments and saw we had some good advantages by getting up this delayed action so we decided the last of March or the first of April to definitely go to this delayed action. We had put out two to three hundred machines from October of 1954 to March 15 of '55. We turned around and gave without any charge this delayed action to every machine we delivered in 1955.

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Q. You made confirmed figures of sale for Roanoke-Holliday. A. We built approximately sixty machines in '54 and approximately 1050 in '55 and we carried over about 25 machines.

Cross-examination.

By Mr. Dowell:

. . . . . .

82 Q. You say in October and November, 1953 you learned about the Holiday machine. A. Yes, sir.

Q. What did you learn about the Long machine? A. I knew about the Long machine. I was there during the summer of '53. They were working on a harvester that was supposed to have an automatic keeper. I was working on a cotton picker. I wasn't interested in the tobacco harvester.

Q. They were working on two. Did you see two? A. No, just one which was close to the front door.

Q. You didn't see the one right behind that? A. No, sir.

Q. You entered into an agreement on March 5, 1954? A. I believe they said the record had the date.

Q. Patent issued March 16 and you entered into the contract on the 5th. You say the biggest change was you lengthened the conveyor chain above the platform and changed the powering. What kind of power did Mr. Long use? A. To convey what?

Q. The conveyor. A. Flexible cable.

Q. So in '54 when you started this machine you decided to do the same thing? A. No, sir.

83 Q. After you built the first one you then changed over? A. Yes, sir.

Q. When was that? A. October, '54. We had had the '54 season.

Q. It was in '54 that you changed over. A. But it was not the '54 machine. It was the '55 machine.

Q. The Long machine was powered from the beginning from a cable, that is conveyor chain? A. Yes, sir.

Q. And the Long machine had pendulum clips? A. Yes, sir.

Q. And yet you say you created the pendulum clip in your factory. A. No. I said we used them.

Q. Where did your idea of using them come from? A. If

any engineer would look at what Mr. Holliday had they would readily see it was not practical but used what he had to start with. Mr. Long had already figured it out.

. . . . . .

85 Q. All you need is sufficient length of time since if going at a certain rate it takes a certain time to pass from that point all you need— A. If sufficient time. We found in '54 the length we had was not in all cases sufficient time. For your fast loopers yes, but unfortunately you couldn't get all fast loopers.

Q. Take those sprockets and move them apart don't you get delayed action? A. Sure, if you get them wider you would get extended time.

Q. Aren't you talking about extended time which primers and loopers would have? A. Yes, sir, but we don't have all the room we want to work on the harvester. We have to design it in a certain space. We have to work within a given distance. Our house is so compact we have to keep a given distance. We have to accomplish the same purpose in a given distance.

. . . . . .

86 Q. Didn't you advertise substantially every week
87 in '55 and show the horizontal run? A. Yes, sir.

. . . . . .

Q. Let's look at this patent machine. Did you ever build this machine as shown in the patent? A. No, sir. We never built that one.

Q. Never built vertical conveyors and vertical chains and seats supported on the vertical post? A. I haven't built that machine and please remember one thing. I am not an engineer. I can show you what I built.

Q. I ask you if you had vertical support and vertical chains and seats supported on those chains? A. That is exactly what we are building.

Q. I am referring to sheet one of the Holliday patent which discloses these upright posts that perform both the function of supporting the vertical chains and at the

88 same time support the seats. You say you don't have those posts for vertical chains? A. Not as they are in that picture.

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89 Q. Have any means to vary or control speed with which conveyor is driven? A. Yes, sir.

Q. How is that? A. We have on our '56, which is hydraulic and also flexible cable.

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Q. Is the driving of the conveyor independent of the speed with which the harvester is moving? A. The hydraulic is but the other one is not completely. Very close to it.

Q. Does your conveyor have spaced opening so you can adjust the clips along the same? A. Yes, sir.

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90 Q. Mr. Harrington, you testified yesterday about certain harvesters sold in 1955. I hand you a page from the News & Observer, Monday morning, July 4, 1955, an ad on page 18 and ask you if that is the type of machine and ad about which you were testifying? A. Everything except our delayed action.

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Q. This is typical of the advertising you did? A. That is a piece of it.

Q. Is it or not typical? A. I would say it is a good example.

Q. All during 1955? A. Yes, sir. We didn't
91 change that mat.

Long offers in evidence advertisement appearing in the News & Observer under date July 4, 1955, and same is marked "Long 24".

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97 Q. How many of those employees of Long did you get Mr. Davis to get from them? A. Not any.

Q. How many did you employ from Long Manufacturing Company? A. At the time Mr. Davis was there?

Q. About that time. A. About the time Mr. Davis was there?

Q. Correct. A. We had Mr. Fred Dawson.

98 Q. Who was Mr. Fred Dawson? A. Welder for Mr. Long.

Q. Was he the head welder? A. I understand he was head welder. I gave him a hundred and seventy-five dollars a week straight time.

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Q. Who else did you employ? A. At that time they are the only two I know of.

Q. Fred Dawson is two? A. And Mr. Davis.

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99 Q. We would like to know when you hired them and when they left you. We would like to have those records.

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Objection by Holliday overruled.

The Court: You want the date he employed Mr. Davis and names of other employees who formerly worked for Mr. Long.

Mr. Dowell: I will give them a list of the names.

Q. You don't recall employing other welders? A. No, I didn't employ them. I don't know of any names. I

100 know we have had numbers of welders from Long Manufacturing Company but I don't know their names. He lays them off and we hire them. We lay them off and he hires them.

Q. Did Mr. Davis work on the harvester for you? A. Mr. Davis spent about ninety percent of his time building hydraulic ram for us. I say he worked about ten percent of the time on the harvester.

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101 Redirect examination of Mr. J. J. Harrington.

Q. I think you said yesterday in response to a question by Mr. Dowell that the machine you manufactured was not the machine shown in figure 1 of the Holliday patent. A. That's right.

Q. And yet you paid Mr. Holliday a royalty. State what you meant by that statement. A. That we are not building a machine designed exactly like this. Our bolts and nuts and frames not made exactly as this one but we feel like we are certainly on Mr. Holliday's patent, don't think we work around his patent, and therefore that is why we pay him the royalty.

Q. You continue to pay him royalty under that patent? A. Yes, sir.

Q. Have you marked the harvester which you have marketed with marking indicating that a patent does exist on it? A. Yes, sir.

Q. What is that marking you have on the harvester and where do you have it? A. We have patent number on it. I believe it is right on the front right here.

Q. You pointed out to the Court that the patent number appeared just below the name of the machine and "Harrington Mfg. Company" on the front cover? A. Yes, sir.

102 Q. That is the patent number of the Holliday patent? A. Yes, sir.

Q. Does that appear on all of the machines you have marketed? A. Yes, sir.

Q. At the time you employed Mr. Davis did you know anything about any photographs that he had given Mr. Holliday? A. No, sir.

Q. Are you sure you didn't know about those at that time? A. I will take that back. I was aware that Mr. Davis had assisted Mr. Holliday in some agreements, or in the way Mr. Holliday stated. Yes, sir, I was aware of that.

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105 Recross-examination of Mr. J. J. Harrington.

Q. Did Mr. Dawson work on the harvester? A. When he came in he was made welding foreman and I think we were through probably two-thirds of the season when he came in.

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107 Q. Did that machine you mentioned have a front end? A. I don't know. I understand the power plant taken out of Mr. Davis' machine and put in the one Mr. Long came up with.

Q. Mr. Davis was working with Mr. Long? A. Yes, sir. It was Mr. Long's machine. Mr. Davis liked to call it his machine but it was Mr. Long's machine.

The Court: "Long 15" is the first machine?

A. Yes, sir.

Q. When did you first begin to make it? A. We started it February or March. I would say March of 1954.

Q. And all you made were like this? A. Yes, sir, all in '54 were like that.

Q. This does differ considerably from the cut in the Holliday patent? A. Yes, sir, but this is a large one.

Q. As I understand it the tobacco would go up and there was no horizontal member from which to take the tobacco. A. No, sir.

Q. You made "Long 15" from March until when? A. I would say until the 15 of July, '54.

108 Q. Made how many? A. Approximately sixty.

The Court: And then you changed the model or construction of the machine?

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109 Walter Roe.

being duly sworn, testified as follows:

Direct examination.

By Mr. Davis:

Q. What is your name and residence? A. Walter
110 Roe, Round Hill, Virginia.

Q. What is your business? A. At the present I am a retired patent examiner and I raise some cattle on a farm at Round Hill.

Q. How long ago did you retire from the patent office? A. Two years the middle of July.

Q. How long were you employed in the patent office? A. Slightly over twenty-nine years.

Q. What position did you hold during your employment by the patent office? A. I was examiner of patents and became assistant primary examiner for ten years.

Q. Your duties during your entire twenty-nine years in the patent office were all connected with examining patents? A. Yes, sir.

* * * * * * * * * *

112 Q. I have asked you previously to examine the Holliday patent, Holliday Exhibit 1, and to examine the Holliday file wrapper and contents which I would like to get in the record.

Holliday offers in evidence file wrapper and contents marked "Holliday 12".

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113 Q. Mr. Roe, have you ever testified as an expert witness in any other patent case? A. Yes, sir.

Q. In what case or cases? A. I testified in a case before Judge Holland, Miami —— Company case.

Q. When was that? A. A year ago in January and we had a re-hearing in April, a continuation of it.

Q. Did you testify both times? A. I did.

Q. Was your testimony accepted there? A. It was.

Q. Have you testified in any other patent case as an expert? A. Yes.

Q. What case was that? A. A case before Judge Hoffman in Florence, South Carolina relating to the
114 Carpet Golf Course. I don't remember the names and parties.

Q. Was your testimony accepted in that case? A. Yes, it was.

Q. Have you testified as an expert in any other case? A. No, that is all.

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The objection by Long is overruled.

Mr. Dowell: May we then offer an expert?

The Court: Certainly.

Holliday offers in evidence file wrapper and contents on the Long patent No. 2,704,158, marked "Holliday 13".

Q. Mr. Roe, you have looked at the Long tobacco harvester as shown by Holliday Exhibits 10 and 11 and have studied claim 7 of the Holliday patent. Will you for the Court compare the terms of claim 7 with the struc-
115 ture shown in Holliday Exhibit 10 and for that purpose it way help you to demonstrate if we have a little model. You may also, if you find it necessary, make reference to either of the file histories.

Mr. Dowell: When we presented that little model we said it was merely to illustrate and was not a scaled model.

A. Do you want me to explain the application of the claim with respect to reference numerals?

Q. Take the claim, piece at the time, and point out what it shows in the Holliday patent, and then what is shown in the Long construction, what does or does not fit that part of the claim, and then you will have enlightened the Court.

A. Claim 7 reads, "A tobacco harvester comprising a frame," That frame is shown at 12 in figure 1 of the Holliday patent. It is tubular structure and is also shown in figure 2 of the Holiday patent. In the Long structure it is composed of this rectangular member which supports the decking on which the loopers stand. The claim goes

on "wheels supporting said frame". The wheels are shown clearly at 68 and 56 of the Holliday patent. That 56 you will have to turn to Figure 3 to find that reference number. Anyway the wheels are obvious. "Vertical members secured to said frame in spaced relationship to each other". These vertical members are best shown in figure 1 of Holliday patent and noted by the reference number 36. The vertical members in the Long structure is composed of this more or less trusslike frame. There is one on each side.
116 They are vertical and they are spaced crosswise of the frame of the machine.

The Court: Are you talking about what is below the platform? You compare that to vertical member 36 of the Holliday patent?

A. Yes, sir. This is one vertical member and this is one vertical member. They are spaced apart.

Q. There is a difference in that and the vertical member in the Holliday patent? A. Yes, sir.

By Mr. Davis:

Q. Serves an entirely different purpose? A. In some respects but as the claim goes on you will find that each vertical member supports the chain mechanism.

Q. The vertical members you referred to, do they support the chain mechanism? A. Yes, sir. "Vertically extending conveyor chains carried by said vertical members". These conveyor chains are vertically extending. They lie in a vertical plane and therefore are vertically extending. Certain portions of these chains in this structure are socalled perpendicular as shown here but there is no question about their being vertical in any claim.

Q. You were just now referring to the chains of the Long device? A. Yes. "Drive means for actuating said chains". Drive means for the chains shown at 60. These sprockets on stub axle attached to the wheel which is on stub axle. It drives a chain shown there but reference character
117 is shown in figure 2 as 104. That is in the Holliday patent. I believe that is wrong. Figure 1 refers to

the sprocket at the top of the machine. I believe it is 102 in figure 3. Those are the chains driven by the rear wheels and they pass from the sprocket 104 upon a shaft which extends crosswise the machine. Further down that shaft is another sprocket, 116, which extends up to a still another sprocket 142. 142 is connected to a shaft which drives through a series of beveled gears shown in figure 5, and top beveled gear 70 drives sprocket wheel 176. Beveled gear 176 located at the top of one of those socalled vertical members. That comprises the driving means for conveyor chains.

Q. Can you point out the driving means in the Long structure? A. In the Long structure, which I presume is the same as the patent, the drive of the chains is from an engine located at the front of the machine above the drive wheel. A flexible cable take-off from that engine is taken back to worm gear upon a shaft upon which sprockets are located which is shown at this point on this model.

Q. You are now referring to the middle cross shaft near the front end of the model with small sprockets at the end? A. Yes. This shaft operated by flexible cable. That in turn drives the shaft.

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118 Q. Go ahead with your comparison. A. "A platform secured on top of said frame". Platform is shown as 32 in figure 1 of the Holliday patent. Is also shown on the model of the Long structure. The claim goes on, "said chains extending upwardly above said platform from therebelow". Clearly chains 178 of the Holliday patent extend from below to above the platform. Likewise in this model of the Long structure the chains extend from below the platform to above it. "Said chains having spring pressed clips attached thereto for resiliently engaging and carrying tobacco leaves". The clips are shown in figure 9 of the Holliday patent, the clips being labeled 216 and 218, and also they are shown in figure 3 as mounted on vertical chains at 210. The clips in the Long device are clearly

shown, not shown in the model but shown in this advertisement.

Q. That is Holliday Exhibit 10 and you show it on the left hand side about a third of the way down? A. Yes. "A plurality of seats". Plurality of seats shown at 228 and 230 of Holliday figure 1. They are shown in the Long structure at this point and this point.

Q. That is two points along the lower part of the side frame? A. Yes. "Means adjustably suspending said seats from said vertical members in back of said chains". The means in the Holliday patent are shown at the
119 figure 1. There is a vertical member that comes at 244 and is bolted to the vertical members of 246. The arrangement is such that these seats may be raised and lowered through a series of bolt holes.

Q. Can you spot a reference character for the bolt holes? A. Reading from Holliday patent, column 5, beginning with line 17, "The seats 228, 230, 232 and 234 are mounted on durable frame-works 236, 238, 240 and 242 carried by vertically extending brackets such as designated at 244 in Figure 1 which are attached by bolts 246 to the vertical members 36, 38, 40 and 42. A plurality of apertures are formed in the vertical members 36, 38, 40 and 42 so that the vertical brackets 244 may be adjustably secured to the vertical members thereby raising or lowering the seats 28, 30, 32 and 34 as may be desired in order to position the picker, as indicated at A, depending upon the state of the tobacco crop."

Q. You don't find any reference character? A. No reference character. It was apparently an oversight.

Q. The adjustable seats in the Long harvester, you find a reference to that in the Holliday Exhibit 10 on the left side, down about two-thirds of the way? A. Yes. In this Holliday Exhibit 10 on the left hand side a little more than half way down is a statement about adjustable seats. "Seats are adjustable up or down to suit the height of the tobacco being pulled. From these seats workers can better see, better select and easier pull the ripe tobacco

120 from the stalks". These seats are shown. There is no reference character, but presumably shown in this picture on Exhibit 10 as being sliding up and down this vertical member and this one here.

Q. The last limitation in that claim is that the seats are back of said chain. I think it is apparent on both the Holliday and the Long device. A. That is correct.

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Q. You have a list of members in claim 7 and you have pointed out each of those in the patent and each in the Long machine. Do the members do the same thing in
121 each machine? A. Substantially the same.

Q. And do they do it in substantially the same way in each machine? A. I believe they do.

Q. Would you be inclined to construe the word vertical in your work in the patent office to mean it had to be something that had to be absolutely vertical in all direction in every claim you might view it in? A. No, I wouldn't. In the patent office we always give a certain amount of leeway because of the fact if you limit a man to vertical or perpendicular unless it is something critical to his device you are necessarily limiting him, making his patent a farce because anyone can come in and change the angle one or two degrees and he is outside. You don't construe the word vertical to mean it has to be perpendicular to a horizontal plane.

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Q. We have in the record the file report and contents of Holliday patent, that is Holliday Exhibit 12. I think you have looked it over. In the course of filing that application or prosecuting it before the patent office did the applicant or his attorney at any time specifically
122 define this word vertical to mean anything in particular and in detail? A. No, sir.

Q. Was the word simply used without any limiting in definition? A. It was.

Q. Would that limit your judgment as to what that word means in this patent? A. I think when a man doesn't place any particular meaning or emphasis on the term vertical I would say that it should not be construed in the same light as if he had.

Q. In other words he could limit it by a specific definition in his patent application or prosecution? A. Yes, sir.

Q. But not having done so you would be inclined to accept the general definition? A. Yes, sir.

The Court: What would that be?

A. Anything would be vertical that would be I should say sixty degrees or on up to ninety. I think anything really under sixty degrees would be stretching it.

Q. What would it be then? A. Approaching the horizontal.

Q. More close to horizontal than vertical? A. Yes, sir.

Q. The strict meaning of it would be ninety degrees? A. Yes, sir.

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124 Cross-examination of Mr. Walter Roe.

By Mr. Dowell, Sr.:

Q. Mr. Roe, you are an assistant examiner. In other words you are the man who actually did the work searching in the patent office. A. Part of the time.

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126 Q. I noticed a moment ago you said with regard to the vertical members that vertical meant substantially so. A. That is the way it is construed in the patent office.

Q. You said down to sixty degrees. A. That would be stretching it.

Q. There is no word substantial in that claim? A. No, sir.

Q. It just says the word "vertical"? A. That's right.

Q. You said also you could change the angle of it and

still be within the termnology of the claim. A. That is correct.

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127 Q. In Claim 7 of the Holliday patent in suit the claim specifies "Vertical members secured to said frame"? A. That's right.

Q. Then it says: "Vertically extending conveyor
128 chains carried by said vertical members". A. That's right.

Q. And near the end of the claim doesn't it say, "A plurality of seats, and means adjustably suspending said seats from said vertical members"? A. That's right.

Q. It is your interpretation of the claim that it is not limited to the language that is used? A. It doesn't limit it to perpendicular as what you are trying to construe it to mean.

Q. Does it limit supporting chains and seats from the same members, whether vertical or a few degrees off? A. No, it doesn't.

Q. The language, "Vertical members secured to said frame in spaced relationship to each other, vertically extending conveyor chains carried by said vertical members", and, "means adjustably suspending said seats from said vertical members", doesn't mean that the seats and chains are supported from the same vertical members? A. No. They could be supported from different vertical members for all that claim says.

Q. There is no question in your mind about that? A. No question.

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130 Q. From your experience as an examiner can a man get two patents on the same invention? A. No, sir.

Q. Would it be possible for him to get another patent on claim 23? A. I don't think so.

Q. Then in a sense he is surrendering 23 when he took out his present patent? A. I expect you are right.

Q. You say you examined both of these file his-
131 tories? A. Yes.

Q. Is there any decision in here to the effect that claim 7 doesn't read upon the Long structure? A. No, I don't think so.

Q. Isn't it true that the examiner in the patent office handling the Long application suggested an interference between Holliday and Long? A. That's right.

Q. The claim suggested for interference was the Holliday claim with some of the termnology claimed, such as the word vertical, taken out? A. That's right.

Q. And as attorney for Long a petition was filed by me in which I took the position that the claim didn't read upon the Long structure. I petitioned the commissioner, who is the highest authority in the patent office, and wasn't that petition granted? A. It was.

Q. And yet you take the position now, having retired from the patent office, that the commissioner was wrong in granting that petition? A. I don't think, Mr. Dowell, the petition was granted upon that premise at all. The petition, as I see it, was granted on the theory that the office couldn't force you to make a claim.

Q. What does the petition say? A. It instructs the examiner to withdraw the suggested claim.

132 Q. Why? A. Because the examiner didn't follow our office policy in suggesting that claim to you.

. . . . . .

135 Redirect examination of Mr. Walter Roe.

Q. Mr. Roe, do you have before you the file history of the Long patent? A. Yes.

Q. Would you turn to the place the examiner first suggested this claim to Mr. Long, page 106. You will note that the examiner suggested that claim and immedi-
136 ately under the suggestion of the claim to Long, the applicant, he said, "The claim being proposed is a substantial duplicate of claim 7 of the Holliday patent, 2,672,248, having omitted therefrom the term "vertical"

from lines 2, 5 and 12, and the terms "vertically extending" from line 4 of the claim as immaterial limitations". What does the examiner mean when he omits some of the claim as immaterial limitations? A. Very often two inventors will be approached, each on the same beam, and one of them will claim something that has no significance and doesn't affect the operation of the device, but in order to set up interference you have got to have identical claims in both applications, so the examiner, if he finds immaterial limitations, or such things as require modified mechanical skill, he deletes those, if possible, from the claim and suggests modified claim to both parties.

Q. And then is it his judgment that the subject matter of the applications or patent and application of the two parties is the same? A. That is in his mind, that there is one invention and he wants to set up interference to determine who really has the prior invention.

Q. So he can give that subject matter to that one. A. That's right.

Q. In this case the Holliday patent had already issued? A. That's right.

137 Q. So Holliday was not in position to assert claim with this limitation left out? A. Yes, sir.

Q. But the examiner considered it sufficient and he thought there should be interference? A. That's right.

Q. Turn to page 112 of the Long file history. Have you read that paper? A. Yes.

Q. What in general did the examiner have to say about the request Mr. Dowell had made that no interference be required?

(At this point Court recessed for lunch.)

Q. Mr. Roe, before lunch we were discussing this suggestion of claim from the Holliday patent with certain modification for interference between the Long application and the Holliday patent. We had just finished discussing the examiner's comments about the limitations he removed from that claim for the purpose of interference as immaterial limitations. I ask you to turn to pages 112-114 in

the Long file history and tell us in your own words what the position was that the examiners took on Long's request not to be required to make this claim. A. The examiner repeated the requirement to make the claim and apply the terms of the claim to Long's structure specifically telling how members read on his structure, and he also pointed out the fact that the term "members" was a very broad one and could be construed as he applied it to the
138 claim, to the device.

Q. In other words the examiner held in that ruling that the claim was proper and that it did properly describe the Long device as shown in the Long application which is now the Long patent? A. That's right.

Q. Did he again, and I refer you to page 114, refer to the difference between Holliday's claim 7 and the suggested claim? A. Yes, he did.

Q. What did he say about that? A. Well, he said claims of this case in their present form differentiate from the Holliday patent.

Q. These claims in their present forms are what claims? A. The suggested claim.

Q. No, you better read the rest of the paragraph. A. The claims he had already allowed in the Long application.

Q. And these didn't include the suggested claim? A. That's right.

Q. These were the ones Long had asked for in his patent? A. That's right.

Q. What did he say about Holliday claim 7 and the suggested claim? A. The difference between Holliday's claim 7 and the suggested claim is not believed material since there is little doubt that such difference would not constitute a patentable distinction.

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139 Q. There was a petition to the commissioner and after that petition, the contents of which were read by Mr. Dowell, we go over and find the Commissioner's decision on page 119. Now have you read that? A. Yes, sir.

Q. Does that in your opinion in any way say that the examiner was right or wrong in deciding that the Holliday claim 7 didn't have any material difference between it and the Long structure? A. No, didn't go into the merits of the claim.

Q. If the examiner had suggested the claim Long and Holliday would have had opportunity to decide who was first? A. Yes.

Q. And when Long didn't want to make that claim he was simply avoiding a contest? A. Yes, sir.

Q. And the Patent Office said let him do it? A. The Patent Office said in effect that he didn't have to make this claim because the examiner under the rules of the office should not have tried to set up interference in the first place. I consider the reason why the examiner I think was trying to do Mr. Dowell a favor in suggesting that claim. Mr. Dowell decided not to do it for reasons best known to himself but to me it seems though the reason the Long application avoided this interference was because they couldn't make the date of Holliday, they knew
140 that Holliday could carry his dates back further than they could carry theirs. In other words they knew as far as claim 7 was concerned that Holliday was the first inventor.

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141 Q. Let's take that particular one up further with reference to this model on the table. Can you point out on that the vertically extending memberr for supporting vertically extending conveyor chains adjacent seats for leaf pickers? A. The vertically extending members are these two frames on either side of the machine.

Q. And do they support vertically extending conveyor chains? A. They do. Here supported from the top and here supported from this point.

Q. Vertically extending conveyor chains adjacent seats for leaf pickers. Where are they? A. Right here.

Q. Where they pass in front of the seats? A. Yes, sir, and over here.

Q. You are pointing to the rear ones? A. Yes.

Q. At this point where the chains meet in front of the leaf pickers are they vertical? A. So close to it it is hard to say there is any deviation, especially in the front chain.

Q. Is there any particular reason why those chains
142 should be vertical right in front of the leaf pickers?

A. The man has got to put the leaves in the clip and he can't be reaching all over to perform that operation. Then it has got to be convenient so he can accomplish that result with facility and as little effort as possible.

Q. Does that have any connection with the fact that the seats are vertically adjustable? A. Yes.

Q. What is that connection? A. As I understand it they pull tobacco at various stages of maturity. Leaves become prime at different periods of the summer. First leaves pulled first and later pullings the seat is raised to accommodate the primer so he can pull the leaves at a higher level.

Q. What was your conception on reading the Holliday patent of the novel feature or combination found in the Holliday patent that is common to the other devices, if there is one? Is there something common to these that you think was novel to the Holliday patent? A. I think the invention is in the concept of a mechanical picker, having a conveyor chain with clips thereon to convey the tobacco picked by the workmen in an adjustable seat from a lower level to an upper level. To me it doesn't make a possible difference where that seat is mounted so long as

behind the conveyor and adjustable in a vertical
143 direction so that in various pickings the workmen

will be able to perform his job with efficiency and despatch.

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144 Re-cross Examination

Of Mr. Walter Roe:

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Q. Referring to the Long patent will you refer to the patent and indicate the vertical members that support the vertical chains and also the seats? A. The vertical members support the chains and also support the seats, one on each side of the machine, and denoted by reference
145 15, 16, 14, 25, 22, 31, 30, 17 and 130.

Q. Are you referring to Figure 1 of the Long patent under consideration? A. Yes, sir.

Q. Is number 16 a vertical member? A. It is an element of a vertical member.

Q. Number 16 is horizontal? A. Yes, but if you want to call it a member call it a member but we chose to call the whole side frame a vertical member. In the Long file application there is a parts list and in that parts list is a picture of this whole side as a unit.

Q. This unit is detachable? A. It is an integral structure, detachable, shown on 118-P. That is what we are referring to as a vertical member.

Q. Looking at Figure 1 of the patent is there any vertical member as a part of that frame that includes the horizontals 14 and 16? Any part of that frame that supports vertical chains? A. Oh, yes.

Q. Where? And I refer to Figure 1 of the patent. A. This Y or V shaped bracket supports this section of chain there which is substantially vertical. This member 150 is part of that vertical frame. It supports this leg just in front of the forward primer that supports a vertical section. This portion of the chain is so close to vertical it is no use arguing about it.

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146 A. As I said before, a vertical member is interpreted by me as the whole frame structure.

Q. Then the answer to my question there is no special vertical member that adjustably supports the seat and also supports the chain? A. You mean the same identical element?

Q. Yes. A. No, there is not.

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147 Re-re-direct Examination

Of Mr. Walter Roe:

Q. If we consider in this model harvester the whole extremity at one side as being vertically extending member and all parts connected to that to be a vertical member then isn't it true that that vertically extending member supports a vertically extending chain? A. Yes, sir.

Q. And doesn't it also support adjustable seats back of that chain? A. Yes.

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153 **William R. Long**

being sworn, testified as follows:

Direct Examination

By Mr. Dowell:

Q. State your name, age, residence and position. A. William R. Long, age forty-one, business manufacturing farm machinery.

Q. Where are you located? A. Edgecombe County, Tarboro, North Carolina.

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154 Q. Tell us something about your background beginning with your youth. A. I was born in Edgecombe County near Leggett, lived there until twelve or thirteen years old on a farm, moved to near Lawrence on another farm and been on a farm practically all my
155 life. I worked on a farm, lived on a farm until I started in business for myself.

Q. How many brothers and sisters do you have? A. Five brothers and one sister.

Q. What was your financial condition in the early days? A. Just lived on the farm and had no money like anyone else. Came up in depression days. Just got what I ate.

Q. What jobs did you perform on the farm? A. My daddy operated a cotton gin and had a blacksmith shop or repair shop that he did repair work on his cotton gin and farm implements and I helped on the machinery end on the farm and also helped with the cotton gin.

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158 Q. We are involved here with a tobacco harvester. What has been your connection with that? A. I was raised on the farm and had to pull those leaves and succors. I thought of a lot of things to make it easier but I had no idea we would come up for succoring but I had given some thought to tobacco harvester where you could ride instead of walk. I gave it thought during the years I was on the farm. As I said a peanut digging machine I have gotten up and several things I got up before coming to Tarboro. I had gotten in the hay baler business and could only go so fast and was unable to do anything about the tobacco harvester until '53. But in '49 Mr.
159 Davis came to work with me. The day he came to work I needed a draftsman and help with tools and fixtures and that sort of situation and Mr. Davis said he had had some experience in helping with tools and fixtures as well as a slight amount of experience in drafting.

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162 Q. With reference to your patent, 2,704,158, when did you conceive of the harvester disclosed in this patent? A. Well, the harvester disclosed in this patent I conceived of it in the spring of 1953, of this particular style of harvester.

Q. This was the consummation of what you had been dreaming about? A. That's right.

Q. How do you place this in 1953? A. Well, I took a trip out to the West coast in late May, 1953 and we had some experimental balers out there running in California and Ed Davis was helping me, engineering at that time and I got him to meet me in San Francisco.

Q. Was that William E. Davis? A. Yes, sir, same one.

He met me in San Francisco. We stayed in a hotel
163 two days waiting for someone to come in from the East coast. During that two day period he continued to ask me when we were going to go back to work on the tobacco harvester. At that time we had pretty much got the baler worked out and Silent Flame tobacco curer coming along. I agreed with him on that trip when we got back home we would go to work on the tobacco harvester. It was about the last of May and I think we have the dates of our trip.

Q. I hand you a sheaf of papers and ask you if you can identify those papers. A. Yes, I can.

Q. What are they? A. Airline coupons where you purchase ticket. Show credit card and purchase ticket.

Q. Does that show the date you made your trip? A. Yes, it does.

Q. When did you return to Tarboro? A. On the 31 of May.

Q. What year? A. 1953.

Q. What day of the week was that? A. I think the 31 was on Sunday. I think I left on the evening of the 31st and got back in here about two or three o'clock the night of the 31st or morning of the 31st, whichever it might be.

Some time during the night of the 31st I got into
164 Tarboro.

Q. What did you do next? A. The next day Ed Davis and I went in the engineering room and began to make some layouts on a tobacco harvester and went to work on a machine of a sewing head type of the same principle he used prior to coming with me.

Q. Did that machine have a frame? A. Yes. It was the sewing head type. I said to Ed: "You handle the sewing

head part. I don't know anything about it and it don't look practical to me but if we going to work on a harvester I will help you all I can." We made a rough sketch drawing to give the man in the plant an idea how to make the structure. We got a certain frame working on the structure for the sewing head to hang on. The next day I suggested to Ed that we go to Van Watson's seed farm. I had recently heard from Braxton Fly that they had a de-tasseling machine. I said, "We will go to Mr. Watson's farm and see if we can buy one of the machines because it already has a power plant in front" which is similar to that one there. We went and bought the machine on Tuesday and then three or four days later I sent and picked it up, as soon as I had a truck to do so. Then we brought the machine home and I instructed certain men to take the front end away from under it. Then we used part of the frame for certain parts of the machine we started to building for Ed Davis with a sewing head on it. That was going along as fast as we could go along with the program. In about a week or ten days I went to Ed Davis and said, "Ed, I see this sewing head is some kind of complicated. I don't see how a farmer is going to have enough hands to keep that needle threaded. They will never work this thing. I want to try an idea I have had nearly all my life." I made the statement before three or four of my workers. I said, "Do you object to me going ahead and building another machine separate from the one you are working on?" He said, "No, go ahead so long as you give me Bill King", and I had another fellow Davis working for me, and he named two other boys and said, "give me all the parts and all the time I want you go ahead". I took less skilled men, went in the tool and tire shop and one machine shop foreman, but all the skilled men helped Ed Davis make his machine. I went to work in the back with two foremen and two helpers, two Harris boys in the country. We went in the paint booth and started the machine.

Q. When was that? A. It was about the 10th or 15 of June, 1953. I started Ed Davis' machine the first day of June, 1953. He continued to work on that machine from June 1 to July 9, the day it went in the field.

The Court: That was his machine? A. Yes, sir. I put all my time with him on his machine until I started to work on the idea I had.

By Mr. Dowell:

Q. I hand you a leaflet and ask you if that is a representation of the Finco Company machine you purchased from the Watson farm? A. Yes, sir.

166 Q. Purchased it the 2 of June? A. Yes, sir.

Q. When did you pay for it? A. Few days after I got it.

Q. Do you recognize this check? A. Yes, I do. With this check before me I paid for it June 13, 1953.

Q. What was the amount of the check? A. One thousand dollars.

Q. Who was it payable to? A. Van Watson Seed Farm.

Long introduces in evidence illustration Finco De-tasseling machine, which leaflet is marked "Long 26".

Q. You supplied help and financial needs to purchase equipment necessary to build a harvester, one that was built by Mr. Davis, or according to his supervision, and one which you had built. You supplied the necessary material and labor in the building of those? A. Yes, I did.

Q. Do you recall over what period of time those machines were in process before they were tested, if they were tested? A. The Davis machine we started to work on on June 1, 1953 and went in the field the first time on July 9, 1953.

Q. I hand you some papers and ask you if you can identify them. A. Yes, I can.

Q. What are they? A. Some parts used in both

167 my machine and Ed Davis' machine.

Q. What are the dates? A. June 23, June 23, June 25, June 29, June 30, July 8 and July 13.

The Court: Tell me how you are able to tell whether some on yours and some on the other. A. Two one quarter horse 12 volt electric motor, which is very unusual motor. They are the only two I ever purchased of that low voltage. He had them on his sewing head. Those sprockets and certain others I used in my own that I remember.

By Mr. Dowell:

Q. You say there was a test? A. The day we went in the field with Ed Davis' machine was July 9 and the day we went into the field with my machine was the 13th.

Q. How do you fix the date? A. It was on Thursday that we were out to where we were in the field and tried it out. It was when my brother Ted Long was pulling his first tobacco. He had a colored girl that helps my mother at the house and a group of other women, had a bunch pulling the first pulling. It was on Thursday. I was at home on Sunday and my mother said, "Bill, did you know Aunt Lottie's husband died right after you were out in the field?" I said, "No, I didn't know it". She said, "He died the next day".

Q. I hand you a paper and ask what that is? A. This is a paper of Louis Lyon, dated 10 of July, 1953,
168 death certificate. That is the man I was talking about. That is an official record.

Q. You stated that you tested the Davis machine on the 9 of July which was Thursday. What was the result of that test? A. We spent practically all morning harvesting ten or fifteen sticks of tobacco and about eleven o'clock he said, "It looks like we are going to have to go in and work on it some more". I said, "All right, let's bring it in as soon as we can because I want to take the front end, motor and power plant unit, take it away from your machine while you continue to work on it". He wanted to do some minor things. I said, "We will take the front end from under it and put it under our machine". That was on Thursday afternoon. So during

that same week-end I had Harris Brothers and a couple of other boys to work the complete week-end taking the power plant from the Davis machine and mounting it on the machine I now have, the one we used the complete season. We left Tarboro with it early Monday morning. Worked over the week-end. Monday morning that machine was taken to Leggett, two miles from Leggett where it was put in the field. That was on Monday, the 13 of July, 1953.

Q. The Davis structure harvested a few sticks of tobacco but was not used for any period of time? A. We practically tied it all by hand. It didn't put a single complete stick on there without breaking the twine several times and gumming it up and stopping it.

Q. What kind of conveyor did that have on it?

169 A. The Davis machine had one sewing head unit. You put tobacco in here. A chain came down the bottom. You pushed the tobacco in, and the twine would come across it here and it worked like a sewing machine.

Q. What was the position of the upper portion? A. The machine he made was up a forty-five incline. Continued straight up. The chain was on a forty-five degree incline that took the tobacco upstairs. What he did was push it in the holder and had little hooks to keep the twine from rolling down.

Q. I show you the Davis patent No. 2,715,968 and ask you if that is the Davis machine about which you have been testifying? A. Yes, sir.

Q. Did you do anything relative to that forty-five degree angle? A. Yes. While he was working on it he made some trial tests in the shop. Tobacco would hang down this way. He went out in the country prior to going in the field on July 9, sent out in the field and got half or two-thirds leaves off of stalks, brought them in the plant. As he was testing them in the plant about the last of June bundles would fall down like this. He had his tobacco stick, his idea was to carry tobacco up and down on the sewing head and pull the stick down beside

it. In doing so he couldn't half get it out of the conveyor because it was binding against the end. I suggested to Mr. Davis, after he built this first unit, to go up so high forty-five degree angle then start horizontally and the sticks would be level out here and be easy to get
170 on the tobacco. He had a man take the head off of the machine and convert the frame where sticks would be at forty-five degrees and then go horizontal. That was one of the major things I helped him with. The second thing I helped him considerably on was get the sticks in a triangular shape instead of square, which was an improvement on his machine.

The Court: Is that improvement shown in his patent? A. No, sir, but Mr. Dowell asked me what it was about.

Q. Did Mr. Davis have any clips on his machine? A. No, had little tiny lugs on the chain that extended a quarter of an inch from the top of the chain.

Long introduces in evidence the Davis patent No. 2,715,968 and marked "Long 27".

Q. You stated you tested your machine in the field on the 13 of July? A. Yes, sir.

Q. What did you do next? A. On the 13 of July we had the machine in the field about four hours and we were harvesting tobacco very satisfactorily from the time we went in the field until the time we left. That afternoon about four o'clock or four-thirty there came up a storm and we had a big rain. At that time I had the machine exactly as the picture shows with the exception I only had two pulleys on it.

Q. I hand you a photograph and ask you—A. Yes,
171 this is the machine.

Q. That is the one you tried out on the 13th? A. Yes, sir.

Q. Long introduces in evidence photograph of side view of Long machine which is marked "Long 28".

Long introduces in evidence photograph of front view of machine tried out on July 13, which is marked "Long 29".

The Court: Those pictures were not taken the day it was tried out? A. I don't think so. On the afternoon of the 13th we operated this machine about four hours near Leggett. Operated until we had a big rain. I was in the field with the machine and I timed the number of sticks we were harvesting per hour and I decided it was too slow for me so I had them bring the machine back in after the rain and that night we added two more seats on the machine and extended the chain over further with two sprockets, two on each side, making a total of four men, but this same machine tried out on the 13th is the same one here. I just added that piece of iron and two more seats making four seats. That was the night of the 13th.

Q. It is all identical as the one you tried out on the 13th except this has four seats? A. And the extension of the chain. That machine as it is now went back in the field on the evening of the 14th, the next day. As far as I know that machine operated the remainder of the season
172 without any further modification.

By Mr. Dowell:

Q. You made some demonstration at different points. Tell us as to time and place. A. We worked in the tobacco field near Leggett on my father's farm, also in tobacco field near Lawrence on my father's farm. Worked several days on the farm of Willie D. Moore near Lawrence known as the Mabry farm, and also worked on a farm near Bethel but I don't remember the name of the farm.

Q. When was that? A. In August.

Q. Of what year? A. The first two days was in July and Willie Moore's farm was in late July or early August. I don't remember. The Bethel trip was somewhere about the middle of August.

Q. Did you make any other demonstrations? A. Yes, sir, but I don't remember where.

Q. Make any out of the state? A. Yes, sir. On Labor Day, September 7 we had this demonstration at the Watson Seed Farm near Whitakers. Following that demon-

stration we took the machine to Canada, Simco, Ontario.

Q. State whether you demonstrated it in Virginia? A. Yes, we had one demonstration in Virginia in late August.

Q. Where was that? A. One at Gretna, Virginia under the supervision of our dealer by the name of Hunt
173 & Sons but I don't know the name of the farm.

Q. At this Labor Day demonstration what was the attendance or what publicity was given to it? A. As I started to the Watson Seed Farm the cars were practically bumper to bumper from Rocky Mount to Watson Seed Farm, one right after the other, like cars going to a funeral, and I was forty-five minutes to an hour getting out to Watson Seed Farm. When I got there they had about five boys out there with walking sticks parking automobiles, but to say how many were there I don't know. I would say from two to five thousand. I am sure over two thousand. A large crowd.

Q. This was Labor Day, 1953, Monday, September 7? A. That's right.

Q. What did you do after that? A. After Labor Day I saw there was demand for the machine because several farmers indicated to me and my salesman they would be interested in purchasing one of those machines as soon as they could get one. And a number of my dealers who I sent invitations to to come to the demonstration, they sold Silent Flame tobacco curers and a few had sold hay balers prior to that, they indicated their interest and wanted to be a dealer. After that day we brought the machine back into the plant and then we made some more machines to display at the North Carolina State Fair.

Q. How many did you make? A. Three.

Q. When was the State Fair? A. Some time the
174 latter part of October, from the 20th to the 25, 1953.

Q. How many machines did you make for the fair? A. Three.

The Court: This original machine you used the power front that you took off of the Finco de-tasseler? A. That never was removed from the harvester. The three I made

for the State Fair I designed the front for the three machines which is very close to what I have today and the frame is practically the same as I have today.

By Mr. Dowell:

Q. State whether you had this on display at the State Fair? A. Yes, sir, and had a contest on at the Fair to invite people in and the one that drew the right number would get a harvester free and we took all orders for harvesters at the State Fair that we could get.

The Court: How many did you get? A. I am safe in saying between a hundred and fifty and two hundred. It was a simple slip they filled out and on that slip they would say, "I want to purchase a harvester as soon as they go on the market". Then we had another slip stating, "If you are interested in a harvester" you would sign it and also if you had a neighbor interested in it.

By Mr. Dowell:

175 Q. What did you do with the harvesters you took to the State Fair? A. One we brought from the state fair and shipped to Venezuela in November, 1953. One of the two harvesters we gave to a boy down near Lagrange or Snow Hill that won one of them but we retained that harvester in Tarboro until the spring when we delivered it. The second one we pulled down for use in the one we have now. The harvester we sent to Venezuela, I went down and met with the people I shipped it to, which is the Venezuela Tobacco Company, then we had a truck to take this machine down to the interior of Venezuela and put it in the field. We operated that machine the whole week I was there and this Venezuela Tobacco Company had different farm crops to go over and so it worked the first week in January, 1954. I took with me Braxton Fly, of Raleigh and we filmed this harvester in the field in Venezuela in this operation and also other films and put it on a tape we used to advertise to promote the harvester in '54.

Q. You said you tested this harvester that you produced. Did you state whether or not they were satisfactory in their operations? A. Yes, I found that the machine worked very satisfactory. I was very well pleased with the results on the 13th when I put it in the field and more so on the 14th when we added extra people to increase production.

Q. I hand you a photograph and ask you what that is. A. Photograph of the machine we had at the North Carolina State Fair that we gave to this boy you see standing beside it.

176 Long introduces in evidence photograph of the Long machine which is marked "Long 30".

Q. Can you identify this photograph? A. Yes, sir, picture taken in Venezuela with Eugene Riddick, President of the Venezuela Tobacco Company, taken in January, '54.

Long introduces in evidence photograph of the Long machine, identified by Mr. Long as the one taken in Venezuela in January, 1954, and which is marked "Long 31".

Q. I hand you additional photographs and ask you if you can identify them? A. Yes. This one was taken near Lake City, Florida, the spring of 1954, transplanting tobacco.

Long introduces in evidence photographs of the Long harvester, identified by the witness as having been taken in or near Lake City, Florida, and same are marked "Long 32A", "Long 32B", "Long 32C" and "Long 32D".

The Court: This is the same machine that dusted? A. Yes, sir and transplanted tobacco. The chains that ran around to hold tobacco up is not on there.

Q. I hand you three additional photographs and ask what they are. A. These three photographs are the first machine we built showing the workers on it in operation.

Q. About what time were these pictures taken? A. Taken my guess is in August, 1953.

Q. Can you tell us what these three photographs are? A. The same machine we first built. This one shows

177 at the Watson farm on September 7.

Q. Do you recognize any of the workmen on any of the photographs? A. I do on two. One is one of the boys that worked for me. Robert Harris on one and a fellow Vick on another.

Q. Do you recall to whom the first sale was made? A. No, I don't.

Q. Do you recall when you started delivering them in the spring of 1954 who got the first machine? A. I take that back on the first sale. Evidently the first sale we made was the machine we sent to Venezuela in November, 1953. That machine was sent over on approval for this demonstration and later in January they paid me for the machine after I returned to the States, so I say actually that would be our first sale.

Q. When did you sell a machine, if you did, to Jack Smith and Arthur Harrell? A. I don't recall that sale.

Q. I hand you a list of papers and ask you to tell us what they are? A. These papers I have in front of me is companies we do business with. That is our dealers for both tobacco harvesters and tobacco curers. The first paper I see is 1953. The most of these names on this paper still doing business with us. I don't see a single one that is not on here. Second list I have is dated 1954 which increases the number of dealers. The next which I have is 1955 which is increase in number over '54.
178 The next is a new dealers list, May 8, 1956. Practically the same dealers and numbers that were in 1955.

Q. These are from '53 to date? A. Yes, sir. '53, '54, '55 and '56. The '53 group of dealers consists of dealers I invited to the demonstration with my oil burner dealers. In '54, '55 and '56 both oil burner dealers and harvester dealers.

The Court: You mean you have sold your tobacco harvester through all these dealers? A. Yes, sir.

Long introduces in evidence lists of Silent Flame and tobacco harvester dealers for 1953, 1954, 1955 and 1956,

and same are marked "Long-33", "Long-34", "Long-35" and "Long-36".

Q. What is the significance of the dates in the list of '53? A. The list I have in front of me is the dealers appointed.

Q. Is that when they were appointed? A. Yes, sir. This '53 list is the date we appointed the dealers in the fall of the year.

Q. Will you clarify me on the point whether the '53 through '56 dealers handled tobacco harvesters for your company? A. Yes, they did.

The Court: You say not all of them. A. That list shows the dealers we had organized specifically for harvesters but some of these dealers handle our tobacco curers too. This is the list set up right after we got into it, and added on the date although didn't sell any in '53, but this list is shown in November, '53. We were starting setting up our dealers for '54. These are some of the oil burner dealers we selected.

179

By Mr. Dowell:

Q. Does this indicate when orders were given to you or when the dealership was set up? A. I wouldn't say that every time one was set up order was given that day. I don't remember.

Q. Tell us something about your financial structure at the end of '53 or beginning of '54, or about that time, and what this meant in the way of a business venture financially and otherwise to you? A. When I went to building this tobacco harvester I had to build a plant to build it in because all the manufacturing facilities I had at that time was tied up on hay balers, so I built Long harvester plant, which has forty thousand square feet in it, to manufacture these harvesters, as well as other things that go into it, and because we had to add on extra machine and presses and other parts, I would say we spent roughly between two hundred and two hundred

and twenty-five thousand dollars by putting up the plant and adding tools to other parts of our plant.

Q. All you were involved in at that time was a mere two hundred and twenty-five thousand dollars? A. I had to add on whatever facilities I had to have to manufacture harvesters.

180 Q. What were the prospects of success or failure? A. Prospects looked good. If I had a failure it would cost me a considerable amount of money. How much I don't know.

Q. Did that two hundred and twenty-five thousand dollars include all advertisements? A. No. Just facilities for manufacturing harvesters. During the year 1954 I assume that for advertising and for promotional sales work and the things we have done to get people interested in the harvester throughout the area to market the machine I am sure we spent over a hundred thousand dollars.

Q. Your total involvement, was it of significance that it would mean your success or your bankruptcy? A. No, I don't think it would have meant bankruptcy. We had other products we were building that we could overcome one jar. Of course that could down me pretty hard if this program fell through but I felt we could overcome it.

Q. It was a pretty large financial involvement? A. Yes, sir.

Q. You started to manufacturing in earnest at what time? A. Spring of '54, about February or March.

Q. About how many harvesters did you manufacture in 1954? A. Manufactured 1429.

Q. How many did you manufacture in '55? A. 2120 is what we sold. Could have been a few more made for experimental work.

181 Q. A total of 3549 harvesters you manufactured and sold during '54 and '55. A. Yes, sir.

Q. What is the average life? A. Should be ten years. Only used six weeks out of the year.

Q. For what other purpose can that machine be used? A. It can be used for spraying or dusting tobacco or any

other high crops, or can be used for transplanting tobacco. Some have been used for harvesting produce. People have used them for that job but not to a great extent. It can be used for hauling irrigation pipe across top of tobacco.

Q. When you say high crops you mean that which grows tall? A. Yes, whether corn or tobacco.

Q. When you produced that tobacco harvester was there any tobacco harvester being manufactured and sold in this area? A. Not that I know of.

Q. I hand you some newspaper clippings and ask you to tell us what they are? A. This one is a clipping from a newspaper of the first tobacco harvester we built. It was put in the field July 13.

Q. What is the date of it? A. September 5, 1953.

By Mr. Dowell: The purpose of this is to show that the harvester was widely advertised and widely accepted.

The Court: The Court is aware of that.

182 It is stipulated that it was widely advertised in the beginning of the fall of 1953.

By Mr. Dowell:

Q. What was the public reaction to this harvester? A. I would consider it a big success. The public seemed to be very enthused. Everyone I talked to about the harvester, saw it operate, were sold on it a hundred percent. Some said, "You ought to do this and that", but by and large it was an overwhelming success, more than any piece of equipment I had had anything to do with manufacturing.

Q. More than the hay baler? A. I would say so.

Q. What about competition today or since you produced your harvester? A. Since I produced my harvester and put it on the market there has been quite a number come out with harvester for sale and we have plenty of competition in the field.

Q. I hand you sheet from the News & Observer dated May 15, 1956 and ask you if you recognize the harvester

illustrated in the upper right hand corner of that page? A. Yes, I do.

Q. Will you briefly describe that harvester as to the features you have in yours? A. This harvester I saw it at the North Carolina State Fair last fall, the first
183 one I have seen of the one on the right hand side.

He has a picture of three harvesters. On the right hand side looking at the paper is shown harvester with unit mounted on frame structure, showing change in equipment. Take the tobacco from the lower level up to the top of the deck and it shows with clips attached to the chain for means of taking tobacco up. I will consider it very closely to the machine we are now making so far—

Q. Does it have process from which tobacco is removed, extends along the area where a stick might be supported? A. Yes, it does, the advertisement showing the Alphin harvester.

Q. I also hand you an advertisement leaf. What is that? A. Another tobacco harvester, Case 88, home office Racine, Wisconsin but I understand made in Anniston, Alabama.

Q. State whether or not that discloses conveyor with clips like some of yours? A. In my opinion it has clips and chain and same method of handling tobacco that we do.

Long introduces in evidence cut of Alphin harvester and same is marked "Long 37".

Long introduces in evidence cut of Case 88 harvester and same is marked "Long 38".

Q. Do you recall any other patenters? A. New Ideal Sprayer at New Orleans making Chinese copy of mine. Harrington Roanoke-Holliday Chinese copy of what we have.

Q. Any others? A. Not that I recall.

184 Q. I notice in this exhibit 38, you know anything about how these people got a machine so close to yours? A. I was told by a supplier that we get supplies from—

Objection by Holliday Sustained.

I went to Kinston last year and saw this machine ready

to go into the field, "Case 88", first day it was brought from the factory to Kinston. I saw it at the Case dealership in Kinston last summer. I would say in the month of July. It was on or about the 10th or 15th of July I looked at the machine as they were assembling it. This machine had certain parts on it that looked like manufactured in my plant and one of the men said it was our parts.

Motion by Holliday to Strike. The Motion is Allowed.

The parts looked simliar to the ones manufactured in my plant.

Q. Have you had any people coming to your plant to your knowledge attempting to obtain information so they might make a harvester like yours? A. In the spring of '54 Mr. Charlie Griffin, who I understood was connected with Harrington Manufacturing Company, came to my plant and asked me would I like to furnish them same clips that held my tobacco that I am using on my harvesters and what would I supply them to them at. That was in the spring of '54 about March or April. I told Mr. Griffin I would not like to furnish clips or leaf holders to him under any circumstances because I felt it was
185 one of the features of my machine. He said, "All right, we will make another style of clip".

The Court: How does the Harrington or Holliday clip compare to yours now? A. I have a roller on mine like a boy's slingshot staff. It doesn't have rollers but made with a "V" type but has a spring like but not a roller. It has jaws. Don't roll but swings.

Q. Mr. Long, with regard to public acceptance, have you granted anyone a license under this? A. Yes, one concern, New Ideal Sprayer Company, Nashville, Georgia.

Q. There has been some testimony given relative to Mr. Davis and his working for Harrington. Do you recall when Mr. Davis left your employ? When he came there and when he left? A. He came in the fall of 1949. I think he left in 1954.

Q. At about what time? A. I think towards the end of the year. I don't remember exactly what time he left. I remember when he came. I think at the end of the year '54.

Q. I hand you memorandum you furnished to me and ask you if that refreshes your memory? A. Yes. I remember this memorandum when gotten up. Came to work November 1, 1949.

Q. Check your records and tell us tomorrow when he left your employ. A. I will.

Q. Did Mr. Davis ever discuss with you the idea
186 of taking some of your employees to work for the company he was employed by right after he left you? A. No, he didn't.

Q. Who is in charge of your hiring and firing? A. John Long.

Q. What is his position with the company? A. General superintendent. In other words all the foremen report to John, twenty-three.

Q. With reference to the man who had something to do with welding and went to work for Harrington Manufacturing Company, do you recall that man? A. Yes, Fred Davis.

Q. Do you remember the circumstances under which he left Long Manufacturing Company? A. Only on hearsay.

Q. Would your brother be the one to testify to that? A. I think so. He worked with him every day.

Mr. Wm. R. Long is called from the witness stand.

John Long

being sworn, testified as follows:

Direct Examination

By Mr. Dowell:

Q. State your name, residence and business occupation? A. John G. Long, residence Tarboro. I work for Long

Manufacturing Company as vice-president of the company and also general manager.

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188 Q. You have heard your brother testify as to the production of his harvester. What is your knowledge of the history of that? A. He described it exactly as I see it. His description was identical as the way I see it.

Q. You have been there at all times? A. I was there at all times.

Q. Were you in charge of those who worked on his harvester and the harvester designated as the Davis harvester? A. Yes, I was.

Q. Who worked on the Davis harvester? A. Mr. Davis and I don't remember those two fellows' names.

Q. There were two? A. My best memory is there were two to six or eight.

Q. Was one named Harris? A. I don't believe
189 Mr. Harris worked on the Davis machine. Mr. Harris and his brother, Louis Harris and myself worked on the Bill Long machine.

Q. Your brother helped Mr. Davis or did he work solely on his own machine? A. Worked on both machines.

Q. Did he spend any appreciable time working on these machines? A. Yes, sir, considerable time during regular work hours and at night he and myself would go back and help get the machine further in progress.

Q. It was a night and day job? A. Yes, sir.

Q. For how long a period? A. From the time it started. Approximately two and a half to three months.

Q. Do you remember when this work was begun? A. I remember they started in the early summer of '53.

Q. You remember your brother and Mr. Davis taking any trips? A. Yes, I do, several trips.

Q. Remember their taking a trip to California? A. No more than they told me about it.

Q. What was your relation to those who helped on the machine so far as welding and things like that on the harvester? A. I supervised the labor in general. On this

particular machine my brother did most of the supervising to start with, the layout work and how he
190 wanted that built. I helped carry out the information I received from him.

Q. When he gave instructions you saw to it they were carried out? A. Yes, sir.

Q. Who was your welding foreman at that time? A. Fred Dawson.

Q. You heard the circumstances about his leaving Long. Are you familiar with that? A. Yes, sir. Mr. Dawson came to me when he left, or before he left and told me his doctor had advised him he had a heart condition and it would be necessary for him to quit work and it would be approximately thirty days after his doctor advised him he could go back to work. I told him he could take thirty days leave. He asked could he come back. I told him yes. In the meantime the boys went ahead and gave him a supper and gifts. The next Saturday I was advised he was working for Harrington Manufacturing Company.

Q. What gifts did you give him? A. I think rod and reel and fishing tackle and suit of clothes.

Q. Any speech made at the supper? A. I made one in behalf of Mr. Dawson. Told him his record with us was all right and we were glad to have him work with us.

Q. That was on Friday night? A. Yes, sir.

Q. The next Monday he was working for Harrington? A. That's correct.

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Direct Examination of William R. Long Resumed

194 Q. I asked you yesterday when Mr. Davis quit work or when his period of employment with you terminated. A. Since then I checked it and it was November 30, 1954.

Mr. Dowell: May I ask if we can have the information when Mr. Davis was employed by Harrington Manufacturing Company.

Counsel for Holliday and Harrington, Mr. Robert F.

Davis, is now handing counsel information relative to employment of Mr. William E. Davis by Harrington Manufacturing Company showing he was employed from February 3, 1955 to April 29, 1955, and also he has given information about Mr. Fred Dawson, who was employed 4/11/55 and is still employed; Mr. John Washington Strickland employed 4/21/55 and his employment terminated 7/29/55; Benjamin Forley Daniel was employed 4/21/55 and his employment terminated September 15, 1955; Robert Neal employed 4/26/55 and still employed; Malcolm Wayne Sherrod employed 4/27/55, employment terminated 6/17/55, and was re-employed 10/13/55 and second period terminated April 2, 1955; William Edgar Holliman employed 5/3/55, terminated 12/9/55. It is agreed by counsel for Holliday that those are the proper dates of employment and termination of employment.

By Mr. Davis: This is information Mr. Harrington gave me as having been taken from the books of Harrington Manufacturing Company.

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204 The Court: Do you consider the invention the additional time given for taking the tobacco off and that your clip remains in a vertical condition thereby eliminating damage to the leaf? A. That's right.

205 Load it in a vertical position and unload it in a vertical position.

Q. The leaf would likewise be in a vertical position until it got to the top and went over the top? A. That's right.

Q. But your idea is it comes in contact with the chain and the leaf is damaged? A. It would be if it goes over and turns bottom up. It is not supposed to get damaged between the time they put it on and the time it gets to the top but I consider the space of time you have to take it off of the chain in the upright vertical position is not ample time for the stringer to take it off because you got a short space to take it off and have to change sticks.

Q. Your contention is that Harrington has accomplished

the same thing by his zigzag, though you say in your opinion it is not as good but the idea is the same? A. The only difference between the zigzag if you spread the chain out a little further.

Q. The idea is getting time to take it off? A. Yes, sir.

Q. Mr. Harrington was saying the zigzag was better because if you lengthen the chain it takes up more room. A. My contention is Mr. Harrington has plenty room to spread his sprockets out as far as he wants to and I do too.

Q. Do you know what the difference is? A. Yes.

206 I have a drawing. Mr. Harrington now has fifty-three inches between center of sprockets. We have sixty. The extra chain on his by putting it zigzag is fourteen inches. If he would spread his sprockets out to get the same amount of time we have he would have to increase his sprockets six or seven inches. I consider that makes it practical. Loading the bundle, taking it from the path and duplicating what they have always had since I have been on the farm. It would be the same principle. You take three people handing tobacco all day, working in one place roughly sixty inches where people take tobacco off of the bench and hand it to the stringer over this area is the method that has been used. What we have is designed to reduce the amount of labor.

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208 Q. I gather from your testimony that your invention is a machine of a certain kind that does certain things. Prior to the time that you or Mr. Holliday were in this field actually building the device

209 what were you using in North Carolina tobacco area in the way of a harvester? A. The only harvester I know of prior to my time was the Alphin harvester from Mt. Airy, or I believe it was Mt. Olive.

Q. I hand you Long Exhibit 13, which is the Alphin patent, and Long Exhibit 37, which is the newspaper advertisement of yesterday and it shows three types of Alphin disclosures. These two exhibits show, in the news-

paper item in the upper left hand corner a tobacco harvester in which workmen were working on a platform. Was that in use before your time? A. Yes, it was.

Q. It didn't have any conveyor did it? A. The left hand corner had a belt conveyor and not a chain conveyor.

The Court: How did the belt conveyor work? A. Four pullers in front of the machine pull it off and put it on the belt and take it upstairs and pick it up off of the belt and hand it to the stringer.

By Mr. Dowell:

Q. Seats for pullers. They put it on an inclined belt that went upstairs and that was taken off by the workmen and handed to the stringer? A. Yes.

Q. That was in use when? A. The first time I
210 saw it was in the summer of '52.

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Cross Examination

Of Mr. Wm. R. Long by Mr. Davis:

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211 Q. This Long harvester that is shown in the patent is that the same harvester that you experimented with on July 13, 1953? A. The system of harvesting is the same. Structure is a little different.

Q. What difference in the structure? A. The structure in the machine we are now building differs from
212 the first one I built slightly in two ways. One is so that the workmen can put tobacco in the conveyor chain behind the rear wheel, and the next is that the frame can be adjustable.

Q. You have changed the construction from that as shown in the Long patent so you now have an adjustable frame? A. No, the Long patent calls for what we are building today.

The Court: The difference between what you are doing now and the first machine. A. The first machine I built two men rode in front of the rear wheel. The one I built

today one rides in front and one behind and frame so constructed that tobacco would pass over and not run into the wheel.

By Mr. Davis:

Q. That is in the present machine and in the patent? A. Yes, sir.

The Court: According to the drawing in the patent it looks like one man in front of the back wheel and one behind it. A. That's right.

Q. That's what you are doing now? A. Yes, sir.

Q. In the first machine you had them both in front of the wheel? A. That's right.

By Mr. Davis:

Q. I think Long Exhibit 28 probably demonstrates that difference. Is there any other difference between
213 the first machine and the Long patent and the present Long production? A. The first machine we powered, for experimental work, conveyor chain with auxiliary motor. First machine had brake on the front wheel which later we moved to the back wheel.

Q. Any fundamental difference? Would you say there is any or not? A. The machine is slightly different in looks but the principle is the same.

Q. As it was in July, 1953? A. Yes, sir.

Q. Did this machine on July 13, 1953 operate in an actual tobacco field? A. Yes, it did.

Q. Who was present when it operated there? A. Robert Harris, one of my employees, as I recall, working on the machine, and Ernie Vick, and I recall Perry Vick, from Leggett, was present, my brother John, and my father came while I was there, and I had someone visiting me from Detroit at the time, Miss June Germain. She was with me. We had other workers from the plant.

Q. You actually had quite a group along? A. No, not over half a dozen there.

The Court: Was Long 29 taken in the field? A. No, sir, taken later. I would say that was taken around probably September 1.

By Mr. Davis:

214 Q. In the course of making this machine and putting it together you referred to doing it in the rear of the paint shop? A. No, sir, done it in the main machine shop building but in the back end of the building and our paint booth was towards the back end of the building and the harvester was built in the rear end of the building but we spoke of it as behind the paint booth.

Q. Did you screen that off so the public couldn't see it? A. No.

Q. It was open for the public to see it? A. No, but the employees could see it. The public is not permitted to go in the plant.

Q. You took it to Leggett? A. Yes, sir.

Q. How far is that from your plant? A. Roughly seven miles.

Q. How did you get it there? A. Drove it.

Q. On its own power? A. Yes, sir.

Q. Did you cover it so people couldn't see what you had? A. No.

Q. People could see it? A. I suppose so.

Q. When you got there and operated it in the field was that field on a public road where it was visible?

215 A. No.

Q. Who did you use on the machine that day for primers and strippers? A. The only one I recall of the workers that day, only one I recall on the machine for pulling was Robert Harris and the driver was Ernie Vick.

Q. Ran just one chain? A. Two chains and two pullers.

Q. How much tobacco did you harvest? A. Ran the machine four hours I would say and we must have harvested a hundred and fifty to two hundred sticks.

Q. Were you completely satisfied with the machine on that day or felt it necessary to do more experimental work? A. Completely satisfied with the function of the machine but I found two pullers were not fast enough to keep two stringers busy and I added two more chains.

Q. When did you do that? A. That same night.

Q. The night of the 13th? A. Yes, sir.

Q. When did you have it out for experiment again? A. The next afternoon.

Q. Where did you go then? A. Back to the same field.

Q. What did you do then? A. Pulled tobacco that
216 afternoon.

Q. Would you consider that further experimental or demonstration? A. I called it experimental.

Q. Would you call it demonstration? A. No.

Q. Did it work satisfactory? A. Very satisfactory.

Q. When was the next time? A. We used it the following week on that same tobacco and then we later used it a few days later over at Lawrence at another farm my daddy has, and later we used it on Willie Moore's farm a part of two weeks.

Q. This would have been in July? A. It is possible it could have been the last week in July or the first in August that we went to Willie Moore's farm.

Q. I would like to have all the use in July. A. Best I recall the uses in July would be at my father's farms and possibly one time at Willie Moore's farm. I usually went with this machine all the time. After I was satisfied it was working satisfactory I wouldn't go to the field every time. I worked on my balers and I traveled quite a bit. We could offer evidence as to where it worked.

Q. When did you say you were completely satisfied with the machine and design stages were over? A. I was completely satisfied on the evening of the 14 of July.

Q. The next time you used it was when? A. Went
217 back into the same field the following week, next time they pulled tobacco, which is usually five or

six days. Possibly it was taken the next day over to Lawrence and used there.

Q. You went to Leggett and to Lawrence? A. Yes, sir.

Q. Who was present at Leggett on the 14th? A. The only one I recall that was present was the crew working on it and it was the same crew as was on it on the 13th. When I went back that afternoon it was one hour or hour and a half before dark. We took the crew from the plant. I went there on the evening of the 14th and there were no farmers there. The only party I saw was some people who lived on the farm. There was a colored man and a colored woman. I don't know their names. My brother Ted came a few minutes before we stopped the machine and John Long was already there when I got there the evening of the 14th.

Q. That was the evening you said you were completely satisfied? A. Yes, sir.

Q. Right after that it was sent to Leggett? A. It was at Leggett at the time. It is my recollection they finished the tobacco and left enough that afternoon for us to try it and the next day we sent it to Lawrence.

Q. At Lawrence who was with the machine? A. That I don't know but I am sure the only two parties I remember at Lawrence that were on there was Harris and
218 Vick. We had some more men from our plant but I don't remember.

Q. There were some farmers at Lawrence? A. When I was in the field there was not.

Q. You made arrangements for them to use it? A. Made arrangement for my father.

Q. Did he have others to come? A. I think so.

Q. Were they visitors? A. I heard they came but I didn't see it.

Q. Who did you hear came? A. Bill Dupree, a neighbor, came to see it work, and a colored man, Ben Carney, came to see it work, and I do know that a tenant, Otis Denton, was there. Who else I don't recall.

Q. You didn't attempt to keep people from going to see it work? A. No.

Q. At that time it was working in the same form we have it today substantially? A. That's right.

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221 Q. But you can recognize, can't you, a type of tobacco harvester into which both yours and Holliday's devices fall? It was quite distinct from anything that had been known prior to the time you and Holliday got into the field? A. My answer is different in some ways.

Q. You do recognize the type? It was common to yours and Holliday's machine from anything that had been in the field prior to that? A. My answer is the same.

Q. Will you answer my question? A. I call it different in some respects. I explained my answer that the Alphin machine I saw about a year in the field working the leaf holders rode and picked the leaves off of the stalk as we now do and put them on the conveyor and took it upstairs and you have two handers pick it off of the belt and hand it to the stringers. My answer is we eliminated the handers on this machine, or my machine and the answer is as I gave it.

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222 Q. Those clips you used on your machine with the two rollers and spring holding them together, that type of clip is also shown in the application for patent of this Mr. William E. Davis. Were you aware of that fact? A. No, sir.

Q. What is the origin of that clip? A. Mr. Davis never made anything like that all the time he worked for me and never had his hands on anything like that. That is the clip I made at the plant. It was my idea. This whole clip idea came up with me and all the men that worked with me know when I came up with it.

Q. When did you work on it? Sometime between June 1 and July 13, 1953? A. Yes, sir.

Q. You devised this clip between the time you
223 started to work on your machine on June 1 and the time you got your machine into the field on July 13? A. That's right.

Q. And that clip was on that machine? A. On that machine. The little offset wasn't on the clip on the 13th. It was straight and what we had on the first machine we had a weight coming out and dropped down here.

Q. To hold the clip in position? A. Right. The clip the same as that picture, referring to Long exhibit 29, showing weight attached to the clip and frame. That clip in use in the first machine.

Q. Mr. Long, when did you first see the Holliday machine, the one shown on the patent? A. I have never seen that machine.

Q. Did you see the first machine Holliday built? A. No.

Q. Didn't you visit the Holliday farm along the last of July, 1953 and see that machine? A. No, sir, I did not.

Q. Did your brother? A. Not to my knowledge.

Q. Did you visit Browder Machine Shop while that machine was being constructed and see it being constructed? A. I did not.

Q. To your knowledge did anyone in your employ
224 do so? A. No, sir.

Q. Did anyone of your knowledge visit the Holliday farm in the summer of '53 and observe the Holliday machine? A. I don't know.

Q. You saw the newspaper reports of the Holliday machine? A. I didn't until Mr. Dowell showed it to me. He got the paper when he was down here. That is when I first saw it.

By Mr. Dowell: That was in '55. That's the first time I saw it, when Yates went to the newspaper office and got it.

Q. When did you know first that Holliday had a machine? A. My brother John was working the harvester near Bethel sometime between the middle and latter part of August, 1953. They came back and told me that a

colored man came out in the field with a newspaper of some machine that was built near Williamston. That was the first I had ever heard of it. I didn't get the name but all he said was it was a wooden frame tobacco harvester. That is the way John described it to me. I wouldn't say whether he had the newspaper or not but to my knowledge the first time I ever saw the Holliday machine or the picture was when Mr. Dowell's son went and got it.

Q. You told us on your direct examination that you had licensed New Ideal Sprayer. A. That's right.

Q. What kind of license? A. License to build
225 the same thing we are building on our patents.

Q. On profit sharing or royalty arrangement? A. Royalty arrangement.

Q. What is that? A. We agreed to let him build the machine on our patent rights for $150.00 a machine but we agreed to give him certain purchase parts at a greater reduction than he was buying them that would add up roughly to fifty to sixty dollars saving to him and we have carried out that obligation.

Q. Then you say roughly he is paying $100.00 royalty per machine? A. Roughly.

Q. How many employees do you normally have with Long Manufacturing Company? A. Runs between three hundred and twenty five and five hundred and fifty. I would say an average four hundred twenty five or four hundred and fifty a year.

Q. It is not surprising if half a dozen employees left your employ and go to something better? A. No, but it is quite surprising that one welding foreman or one foreman go and take a group of men in one or two day period.

Q. If that happens? A. If it happened.

Q. Do people come from Harrington and go to work for you occasionally? A. I am sure there have been
226 some in changing men.

Q. You wouldn't be surprised if a dozen men over the past two or three years did that? A. I am not familiar

with it because I don't keep up with the men but I think that would be a little high. I would say six or eight in that period of time would be more like it.

Q. Can you identify this photograph as a photograph of your most recent model machine you are about to put out? A. Yes, it is.

Q. What is that? A. Silent Flame All Purpose.

Holliday offers in evidence photograph "Silent Flame All Purpose," marked "Holliday 14".

Q. What is the particular change you have made in that harvester? A. We put a hydraulic lift on the back and it drives from the rear wheel. Power lift that operates from cables and it drives from the rear wheels.

Q. That power lift on the back, Roanoke-Holliday had that last year didn't they? A. Not that I know of.

Q. You haven't seen Roanoke-Holliday with that? A. Not this year.

The Court: What is the power lift for? A. That is where you lower the tobacco down to the ground rather than hand it down.

(Short morning recess)

By Mr. Davis:

227 Q. You were talking about the use of your machine in 1953 in July. You made a trip to Virginia. Was that in July? A. No, that was in late August.

Q. These trips you did make, you made several trips from one farm to another? A. Yes, testing the machine.

Q. They were all under its own power? A. Yes. Part of the time we hauled the machine and part of the time we drove it. Depends on distance. In the meantime, while we were testing this machine it was constantly brought back in the plant and different work done on it all during the summer while testing it. In July and August we continued to bring it back and change different things.

Q. I notice you changed the designation to "test the machine" since we had our recess. Did you discuss the

possibility that your activities had amounted to a public use of that machine more than a year before your patent application was filed? A. My attorney asked me when you went out the door what did I mean about completely satisfied in July and I said to him that I meant I was satisfied with the principle and idea and that is what I meant. I meant when I went in the field on July 14 the principle and idea that I had was satisfactory.

Q. Did he explain to you during that recess that if you had really completed your machine before July 28, 1953 and had used it publicly before that date that that
228 would constitute a bar to your obtaining patent? A. No, he didn't.

Q. He did warn you that the use during July had better be experimental? A. That's right.

Re-Direct Examination

Of Mr. Wm. R. Long:

Q. Mr. Long, when was your public demonstration? A. The first time we opened that machine up for public demonstration was Labor Day, September 7, 1953.

Q. Will you explain where that was? A. Watson Seed Farm.

Q. You say you made some changes. Will you tell us what those were? A. Yes. As I mentioned earlier, we had clips on the chain with weights and were getting interference with the leaves going over the weights on the opposite side and that is why we designed the leaf holder in that manner, and second, we were having trouble with the auxiliary power plant in the machine stopping up with leaves. It would suck leaves in and we found it impractical and had to redesign gear box during the test and go in for a conveyor drive for it, and as I explained earlier we had to change brakes from the front wheel to the rear wheel because it had a tendency to turn over, and we were constantly testing it as we went from field to field.

Q. Mr. Davis filed application on the 8 July, 1954.
229 Did you know anything about that? A. No, I didn't.

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230 Re-Cross Examination

Of Mr. Wm. R. Long:

Q. I am reading from deposition of William R. Long taken in action 350 in Washington, D. C. June 24, 1955. This apparently is a question to you and your answer found on page 7: "Question: Was the Silent Flame tobacco harvester ever publicly demonstrated? Answer: Well, the first time we carried it into the field was when tobacco was ready around July 1 in my area and the first day I carried it in the field some twelve or fifteen farmers in the field looking at it while I was there. There may have been more out there but I was there about two hours a day." Is that your testimony you gave at the time? A. I am sure it would be.

Q. And was this Silent Flame tobacco harvester the one we have been discussing today and the one shown in your patent? A. Yes, sir.

Q. And was this around July 1? You referred to around July 1, 1953. A. When I testified to that I had no records to pin days down at that time which later I have had records to pin dates down.

Q. It was around July, 1953? A. Right.

Q. You are willing for this to stand as your testimony? A. Yes. I see no difference from what I have already testified.

231 The Court: You say now it was the 13 of July? A. Yes, sir.

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William Wallace Cochran

being sworn, testified as follows:

Direct Examination

By Mr. Dowell:

Q. Your name? A. William Wallace Cochran.

Q. Will you give us your background and qualifications as a patent expert? A. I came into the patent office in 1916 as a lowest grade examiner, fourth assistant. In 1928 I had worked myself up to the position where they appointed me as chief of one of the divisions and in 1935 I was made a law examiner. In 1940 I was made Solicitor of the Patent Office. I retired in 1949 and entered private practice.

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232 Q. What are the duties of the solicitor? A. He has general duties of being advisor to the Solicitor, taking care of litigation, having certain assistants under him called law examiners and he and the law examiners handle all cases in Court in which Patent Office is involved.

Q. So far as the legal end of the Patent Office is concerned the Solicitor is tops? A. I believe his definition is he is chief law officer of the Patent Office. That is all under the direction of the Commissioner.

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234 Q. We are only concerned with Claim 7. The first six claims containing structure we are not interested in. A. I have read Claim 7 carefully.

Q. Will you apply Claim 7 to the structure you have just described? A. It is a very simple claim. Structure is not too complicated. The first clause is a "tobacco harvester comprising a frame." That is frame 12. The specification says so, column 3, line 10. There it is stated the frame 12 includes a pair of side frame members 14 and 16 which are joined by transverse members 18, 20, 22 and 24. That is the frame the claim refers to. "Wheels

supporting said frame". 68 in front and 56 and 58 in the rear. "Vertical members secured to said frame in spaced relationship to each other". Those vertical members are described in the specification, column 3, beginning in line 25 as follows: "Welded or otherwise secured to the transverse members 20 and 22 and the horizontal members 26 and 28 are vertical members 36, 38, 40 and 42". These vertical members are shown on Figure 4 of the patent pretty clearly. The next clause, "vertically extending conveyor chains carried by said vertical members". Conveyor chains shown in Figure 1 by the reference numeral 178. They extend straight up and down alongside the vertical members we have been talking about. The next clause, "drive means for actuating said chains". Sprockets shown for that purpose. The next clause, "a platform secured on top of said frame". I have already referred to that. That platform is 32 I believe and it is described in the specification in column 3 beginning with line 32: "The platform 32 is formed with a plurality of transverse ribs 44 forming the strength members of the platform 32." "Said chains extending upwardly above and below the platform. I think Figure 1 shows it very well. Figure 3 shows it very well. "Said chains having spring pressed clips attached thereto for resiliently engaging and carrying tobacco leaves." The clips I think indicated by reference number 210 on Figure 1 but shown more in detail I believe in Figure 8 and Figure 9 which are on sheet 4 of the drawing. "A plurality of seats, and means adjustably suspending said seats from said vertical members in back of said chains". The seats are clearly shown in Figure 1 and are indicated by the numerals 228, 230, 232 and these seats are suspended from the vertical members, the bottoms all being bolted thereto by bolts 246. Apparently there are several holes there so that the bolts may be selectively entered into the holes to allow adjustment of the seats upward or downward. It seems to me the claim very clearly reads properly upon the disclosure. I see no criticism.

Q. Now refer to the Long patent. You have examined this patent. A. Yes, I have. I wouldn't say I know every word of it. I haven't had time to do that but I realize how it works.

Q. State briefly the structure of this patent. A. We have in the Long patent a vehicle with the front wheel 46 and rear wheels 33 supporting a frame, the whole framework, the frame indicated by the numeral 10 on Figure 1. The purpose of this frame of this harvester is to form a mounting for the conveyor chain, several of them such as indicated by the numerals 123. This conveyor chain is turned over and around and above and below certain sprocket wheels so that the chain goes down toward a workman seated down underneath the platform on a seat and then upward over the sprocket wheel 154 down to another workman seated ahead of the first one and then back up to the horizontal portion shown very clearly in Figure 1. In operation the conveyor chain goes down to this first workman and he can pick tobacco leaves off of the plant and place them on clips shown in detail just below Figure 1 in Figure 18. This particular workman at the rear of this machine is apparently working on the outside row of plants shown there. The workman seated ahead of him is apparently working on in side row of plants. This
237 chain has a series of clips to which the rearmost workman fastens these leaves of tobacco. The chain also has another series of like clips on the other side and the workman seated in advance uses that side of the chain to put the leaves on.

Q. How are the clips connected to the chain? A. As shown in Figure 18 each double length of chain has transverse holes through there and the chain is 130, which may be entered in through any pair of holes, clip may be mounted on different positions on the chain.

Q. What about the position of the clip at all times? A. It is pivoted around this axis 130 so that whatever disposition or slant the chain is in this clip with tobacco

leaves in it will always hang in the same position with the tobacco leaves hanging downward from it. When the chain is carried to the upper level above the platform 12 the man standing there takes the tobacco leaves from each clip and puts it on a stick, I believe you call it. There is a horizontal section that gives them time to take them off before it goes around to the next pulley.

Q. How is this machine powered? A. By an engine up in front.

Q. Three wheel structure like the Holliday disclosure? A. Yes. That is the general operation of the Long structure.

Q. How is the conveyor chain driven? A. I believe flexible shaft that operates from wheels—

238 Q. From a power plant? A. Oh, yes.

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240 Q. I ask you whether you have examined a Roanoke-Holliday machine and a Long machine, and by machine I mean tobacco harvester? A. I was taken to the rear of the Ford agency and I found there and there was shown to me the so-labeled Roanoke-Holliday harvester.

Q. Right across the street from Long Manufacturing Company? A. I believe so. Later I was taken to see the Long machine which was parked on some side street but I don't know just where.

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242 Q. You said the machine corresponded to what was shown in the patent. Will you tell us whether Holliday patent, Claim 7 reads upon and consequently the structure, as found in the structures of Long and Holliday as illustrated in those exhibits we have just mentioned, Long and Roanoke-Holliday? A. I have already said it reads on the patent. You are asking whether Claim 7 reads on the Roanoke-Holliday machine which I observed yesterday behind the Ford Agency and whether

it reads on the Long machine, which I also observed yesterday and perhaps on some of the illusrations.

Q. That's right. A. My conclusion is no, it doesn't. First of all I take the Long patent.

Q. Since that is the structure Long is making? A. Yes. First of all "tobacco harvester comprising a frame". Long certainly has a frame 10, which extends all the way around halfway here high on the machine. "Wheels supporting the frame". No question but what Long has the wheels. "Vertical members secured to said frame in spaced relationship to each other". There are some vertical members shown in the Long patent, shown as supporting this canopy in Figure 1 and apparently near the corners of the frame. It is hard to find any other vertical members although it does appear that this workman sitting forward at the lower portion of Figure 1 is on a seat which is mounted on a vertical member 25. It is hard for me to find any other vertical members in this figure or in any figure of the Long patent. Then "vertically extending conveyor chains carried by said vertical members". The vertical members I have found that support the canopy of the machine certainly don't carry any conveyor chains. Conveyor chains are entirely separate. They are carried, as Your Honor can see, over and around and under sprocket wheels which are mounted on various kinds of shafts such as 147 in Figure 1, each shaft in turn mounted on cross bars which in turn are supported on the frame. So the vertical members I have found in this patent have nothing to do with supporting the conveyor chain nor is conveyor chain anywhere in this patent in a vertical position. Every rung of that chain appears to be at an angle to the vertical. They are all slanted except the top which is horizontal. No part of the chain, it appears to me, appears to be vertical. For that reason I would say that Holliday Claim 7 does not cover the Long structure nor as shown in Long patent, nor the Long machine which I observed yesterday, nor the Roanoke-

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244 Holliday machine which I observed yesterday. "drive means for actuating said chains". That particular element is shown in all of these devices. "A platform secured on top of said frame, said chains extending upwardly above said platform from therebelow."

By Mr. Davis: The platform on the top, you agree to that? A. Yes, sir.

"Said chains extending upwardly above said platform from therebelow". That is true except at the point where the chains were not vertical. "Said chains having spring pressed clips attached thereto for resiliently engaging and carrying tobacco leaves". Present in Long and in Roanoke-Holliday machine and in the two machines I saw yesterday. "A plurality of seats". That is true of all these devices. "Means adjustably suspending said seats from said vertical members in back of said chains". But there is where the claim departs from any disclosure. The claim says "means adjustably suspending from said vertical members" and the only vertical members I was able to find was possibly 125 in Figure 1. Here is where the claim fails. None of those vertical members carry the conveyor chain as the claim recites as I recited earlier.

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245 It is hereby stipulated and agreed between counsel
246 with the approval of the Court that Major Robert Harris, Ernie Vick and Louis Harris, if called here to testify, would each corroborate the testimony given by William R. Long and John G. Long as to the production of the harvester behind the paint booth in the Long plant and that they participated not only in the production of the harvester but in the numerous tests of the same machine by Mr. Long, the first test being on or about July 13, 1953.

Direct Examination

Of Mr. W. W. Cochran Is Resumed:

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249 Q. From the sum and substance of your testimony Claim 7 of the Hollid'ay patent does not read on any of the structures except what is shown in the patent? A. That's right.

Q. And the claim of the Long patent. A. The claim I read?

Q. The claim you read of the Long patent, which is Claim 1, does read upon the Roanoke-Holliday and
250 the Long harvesters? A. I think so. That is my view. I also looked at Claim 2. It is very much the same as Claim 1. It added to claim 1 a clause, "A traction wheel mounted at one end of said frame for pivotal movement about a substantially vertical axis, ground engaging wheels supporting said frame in spaced relation from said traction wheel, power means for driving said traction wheel". That clause doesn't change the claim. It has the same applicability to this construction as Claim 1.

Q. How about Claim 3? A. As I recall it Claim 3 adds the clause, "in which the conveyor is driven from the power means through variable speed control mechanism". That is in addition to what is in Claim 2. It is my understanding and recollection in observing these objects that they had that sort of speed control mechanism. I remember one had pulley with belt with different size runs on them.

Q. I suppose the same thing is true as to Claim 4? A. Oh, yes. All these machines had means of supporting the leaf stick.

Q. And Claim 6? A. Claim 6 calls for everything in Claim 1 plus the limitation, "that the mounting means for said clips is adjustable along said conveyor". That was true because they had holes in the chain, and "and including a substantially L-shaped suspending member". These devices I saw had that. I don't know that it is shown.

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Q. I call your attention to Long Exhibit 16. A. I
251 don't know about Long Exhibit 16.

Q. Is that the type of clip? A. Yes, and it is also shown in this Long Exhibit 25 on the reverse side in the lower right hand corner. These clips are shown with little spring wires holding them, bracing them to a closed position.

Q. Adjusting holes. Did you notice them? A. Which claim are you referring to?

Q. Claim 6. A. Yes. I thought I mentioned that. Two holes in each odd link of the chain by which the stud on the clip can be entered in any position.

Q. And each clip had a flared mouth? A. Yes.

Cross Examination

Of Mr. W. W. Cochran By Mr. Davis:

Q. Mr. Cochran, do I understand correctly you haven't examined the prior art in this case? A. That is true. I haven't had opportunity I have been so pushed for time.

Q. Don't you ordinarily consider in order to consider the scope of claims you should consider the prior art and try to decide what the invention is trying to define over and above? A. If some vagueness.

Q. Would it make any difference to you how you construed the word "vertical" in the Holliday patent
252 to know whether or not that word had been put into the patent application by the inventor's counsel for the specific purpose of overcoming some reference or whether it was simply choice of words in describing the invention? A. I don't think it would make much difference. Of course it would reenforce the opinion I have about it as to the significance of the word.

Q. You would take anything you found in that file report and contents that would reenforce your opinion but you would not take information to the contrary? A. It would have to be very strong when a man puts a very definite word in his claim like that.

Q. I tell you in the Holliday application the word "vertical" was used without any special attempt to overcome anything. It was simply choice of word by the inventor's counsel and I ask don't you think it deserves a very liberal interpretation? A. I would say the disclosure is clear, the claim clear in its language. It is not much use to try to go outside the language of the claim and disclosure in a patent to determine what the claim means. No use to indulge in mental gymnastics where your own common sense tells you what that language means considered in the light of the drawing, and as you say, some liberality in construing the word "vertical". I didn't say substantially vertical but if you waver a little from vertical it made no difference. The Court could use some slight difference between vertical and not quite vertical.

Q. Are you aware of the general holdings of the
253 Courts to the effect that the determination of infringement is usually based on whether or not the devices perform the same function in substantially the same way rather than duplicate of the drawings of the patent? A. The courts do but perhaps this slanting in the chain of the Long structure has some advantages that the vertical doesn't have and that the Holliday vertical conveyors have disadvantages. I could mention those if it would be helpful to anyone.

Q. I don't think it would be. Did you note in comparing the Holliday patent and the Long patent that both of those devices provide a high level machine adapted to run down a tobacco field with a big wheel, big front wheel, between two rows of tobacco and that the two side or rear wheels span the two rows so they don't run over the tobacco? A. I see from the drawing that is his idea.

Q. And that the platform on the machine high enough to clear tobacco and furnish platform for working and storing tobacco? A. Yes.

Q. And that in both machines seats provided for primers at a lower elevation? A. Yes.

Q. And were those seats adjustable so that the man could be conveniently seated? A. Adjustable on the
254 Holliday patent. I haven't checked the Long.

The Court: They are.

Q. And that in each of these devices you have conveyor chains that make it convenient for a man picking the tobacco to put it on clips on the chains and send it upstairs? A. Yes.

Q. Don't you say in these several features about which you heard testimony that all new in those two new machines was fundamental basis in those two cases? A. Assuming there was no prior art that would not be a major accomplishment.

Q. They were very successful machines for tobacco picking and harvesting. Don't you feel it is up to the Court to lean over backward to see that the first inventor of such machine gets liberal construction and adequate protection? A. I wouldn't say.

Q. Isn't that the general trend of decisions as you have read them over the years? A. I rather not commit myself. Both people have patents. They have their reward as to whether one infringes the other. Which way the Court shows liberality the Court would have to balance that.

Q. Wouldn't you balance it on who was first? A. I wouldn't ignore the scope of the claims.

Q. Would that be a major consideration in the construction of the claims, strongly perceive about how
255 liberal the claims should be considered? A. I wouldn't like to speculate on that.

Q. Would you consider the walls of this courtroom to be vertical? A. Yes, the side walls are vertical.

Q. If I show you in the Long patent, Figure 4, can you not visualize that the frames and chains that you see extending vertically at the side are vertical in the same sense these walls are vertical? A. Your Honor, if you look in this direction at this pencil it looks as if vertical, but if you look at it from the side anyone can see it is

not vertical. Looked at from one angle any slanting member which is straight perhaps looks vertical.

Q. These frame members do generally extend upward? A. Anything extends in a vertical plane. No matter how much you incline this pencil it is not vertical but you can put a vertical plane through it. The fact that a vertical plane can be passed through a thing is always true no matter where it stands and that doesn't make the pencil vertical.

Q. These side members of this frame in Figure 4. A. Vertical plane can be passed through them.

Q. And single vertical plane could be passed through each of these chains? A. I assume so.

Q. What is the purpose of these chains in the Long
256 patent? A. For the bundles of tobacco.

Q. To carry it upward? A. Yes, sir, and from the side for all I know, and also to provide a stretch at the top.

Q. The main purpose of the chains in the Long patent is to get the tobacco from the man at the bottom, the primer, up to the man on deck who takes it off of the chain? A. Yes, and the further purpose of making it very convenient for providing a long stretch at the time.

Q. The prime purpose is to move the tobacco upward? A. Yes.

Q. And this is the fundamental purpose of the chains in the Holliday patent isn't it? A. Of course.

Q. And isn't that where the word "vertical" got in the Holliday patent, to change the patent to move tobacco upward in a general vertical direction? A. He could have said, if he meant that, to convey the tobacco from the lower level to the upper level instead of saying vertical. But he did say vertical and we are here to construe it.

Q. I went over Claim 7 as you did and I underlined the part you said was conceded to be in the Long machine. You said "A tobacco harvester comprising a frame, wheels supporting said frame". You skipped "vertical members secured to said frame in spaced relationship to each

other". You construed that to some other. "Vertically extending conveyor chains carried by said vertical
257 members". That you say it didn't have because didn't have vertically extending conveyor chains. Don't these members as spelled out in this claim perform the same function in the Holliday patent as in the Long patent? A. Intended to and after a fashion I suppose they do.

Q. "Drive means for actuating said chains, a platform secured on top of said frame, said chains extending upwardly above said platform from therebelow, said chains having spring pressed clips attached thereto for resiliently engaging and carrying tobacco leaves". All these we have in the Long structure? A. Yes.

Q. "Means adjustably suspending said seats", which you do have in the Long structure? A. Yes.

Q. But you don't have that means adjustably suspending said seats from said vertical members in back of said chains? A. That's right.

Q. They are suspended back of the chains in Long? A. Yes.

Q. Does it make any difference whether these seats are suspended from vertical members or something else as long as adjustably suspended where you want them to be? A. Structure in the Holliday patent is not a question whether good as Long or better but it is good both in description and drawing.

258 Q. Performs the same function and in the same manner? A. I don't know that you could say that. I haven't seen the two operate. I have been told it is not as good, doesn't do it as well but that is not from my own knowledge. I have been told there are advantages in having the chains slanting but I don't know of my own knowledge.

Q. Let's go back to the file history of the Holliday patent. I don't know whether you were here when we were discussing the fact that a claim similar to Claim 7

of the Holliday patent was suggested to Long during the pendency of his application or not. A. I heard something about that. In fact I think I looked at that last night.

Q. The examiner struck out the "vertical" and "vertically extended", and suggested they were immaterial limitations. Does that have any bearing on your construction of Claim 7? A. No, the fact he said they were not material limitations.

Q. Did you read the Commissioner's decision? A. Yes, but I can't quote it to you.

Q. Did the Commissioner say he was overruling the examiners upon whether these limitations were immaterial? A. I couldn't say.

Q. Will you look at it and tell us for certain? I would like a definite agreement from you that it doesn't overrule. A. The decision speaks for itself and the Court can read it.

• • • • • • • • • •

263 Q. A while ago you were talking about a run of the chain. How would you define that? A. It is a portion of the chain between two adjacent- or between any two sprockets or pulleys wouldn't it. I have never qualified myself as an expert in tobacco harvesters.

Long Rests.

• • • • • • • • • •

HOLLIDAY EXHIBIT 1

March 16, 1954

J. B. HOLLIDAY

TOBACCO HARVESTER

2,672,248

Filed Oct. 9, 1953

4 Sheets-Sheet 1

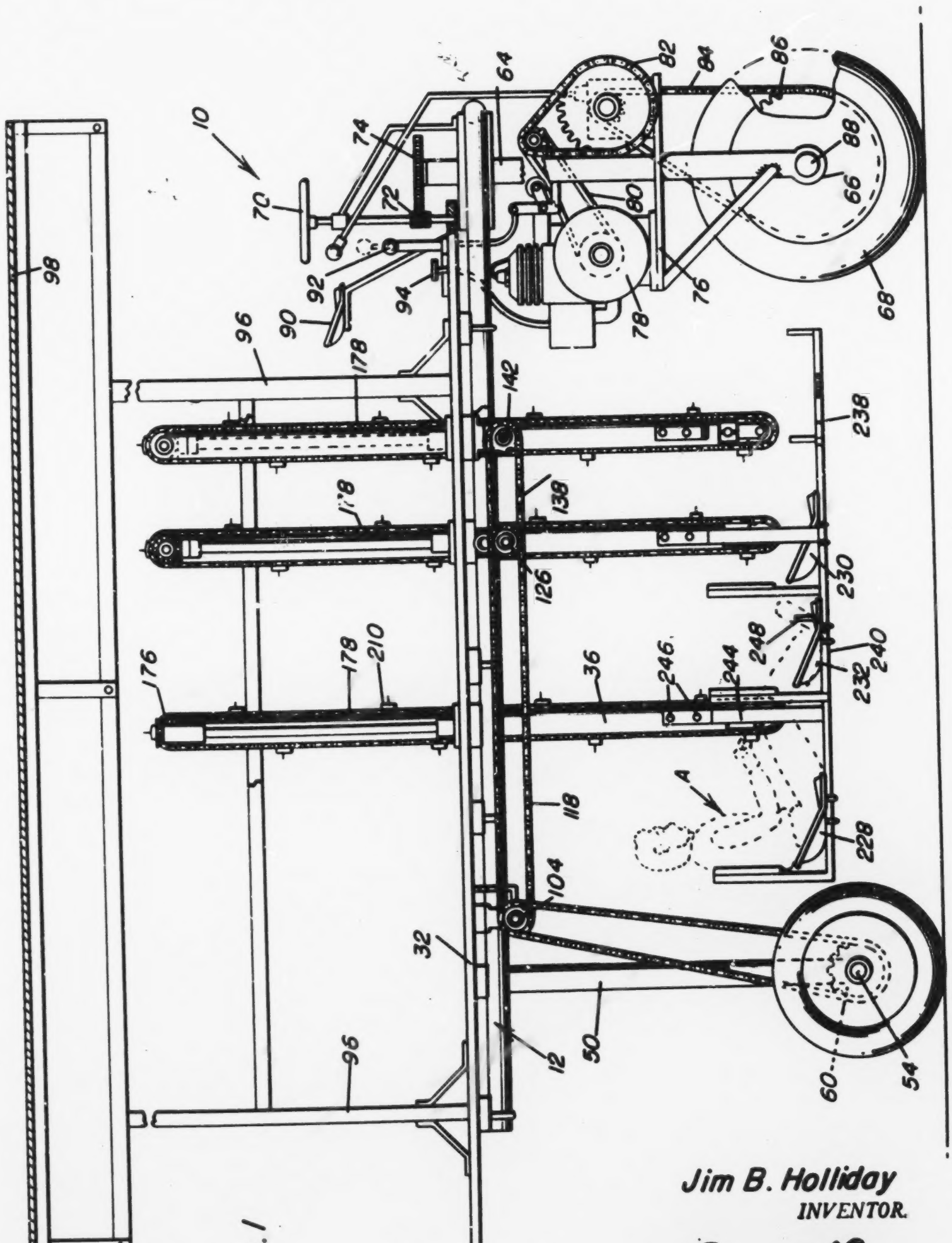


Fig. 1

Jim B. Holliday
INVENTOR.

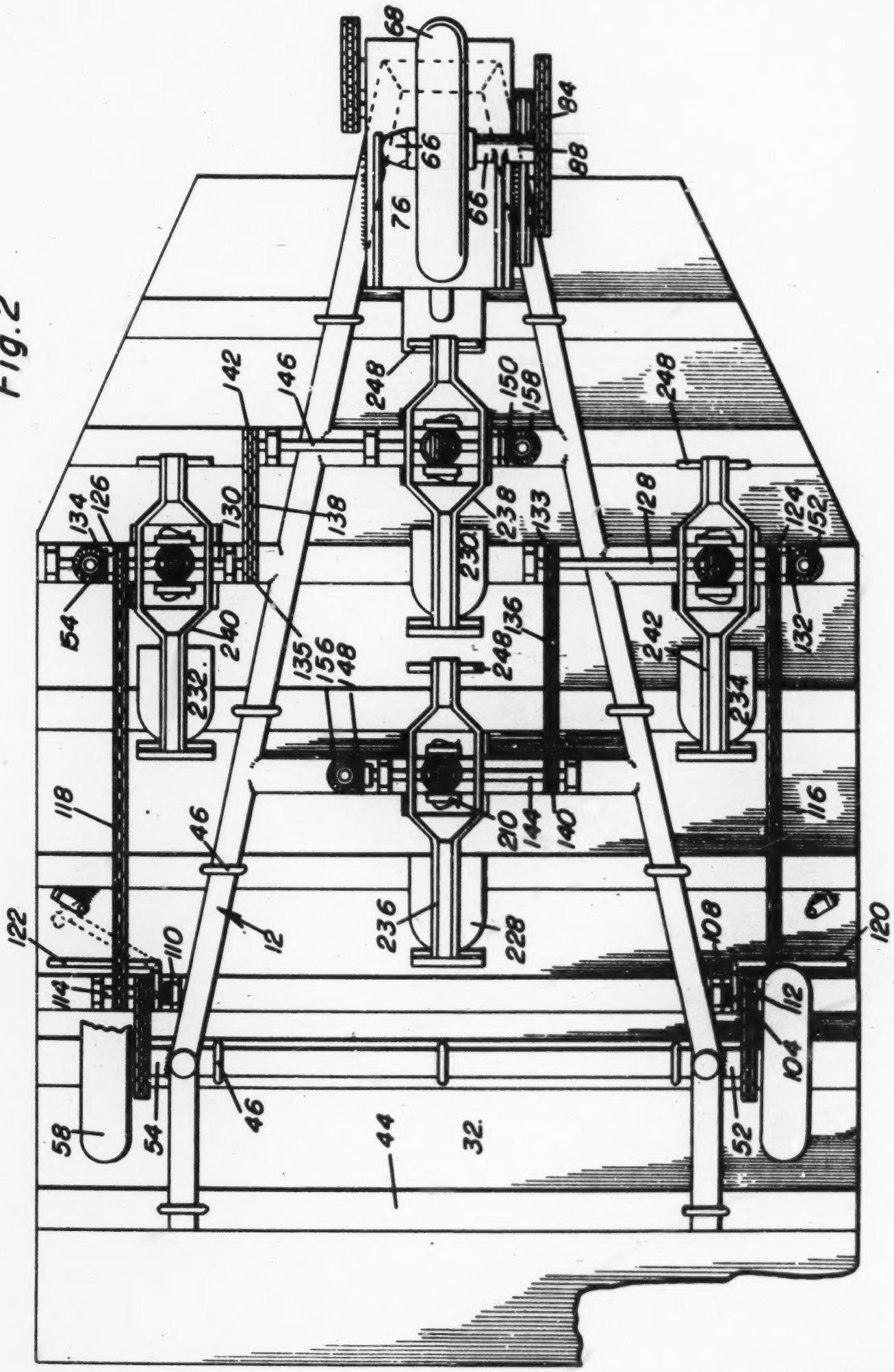
BY Thomas A. O'Brien and Henry W. Jenkins
Attorneys

March 16, 1954 J. B. HOLLIDAY 2,672,248

TOBACCO HARVESTER

Filed Oct. 9, 1953 4 Sheets-Sheet 2

Fig. 2



Jim B. Holliday
INVENTOR.

BY Thomas A. Dixon and Henry K. Jenkins
Attorneys

March 16, 1954 J. B. HOLLIDAY 2,672,248

TOBACCO HARVESTER

Filed Oct. 9, 1953 4 Sheets-Sheet 3

Fig.3

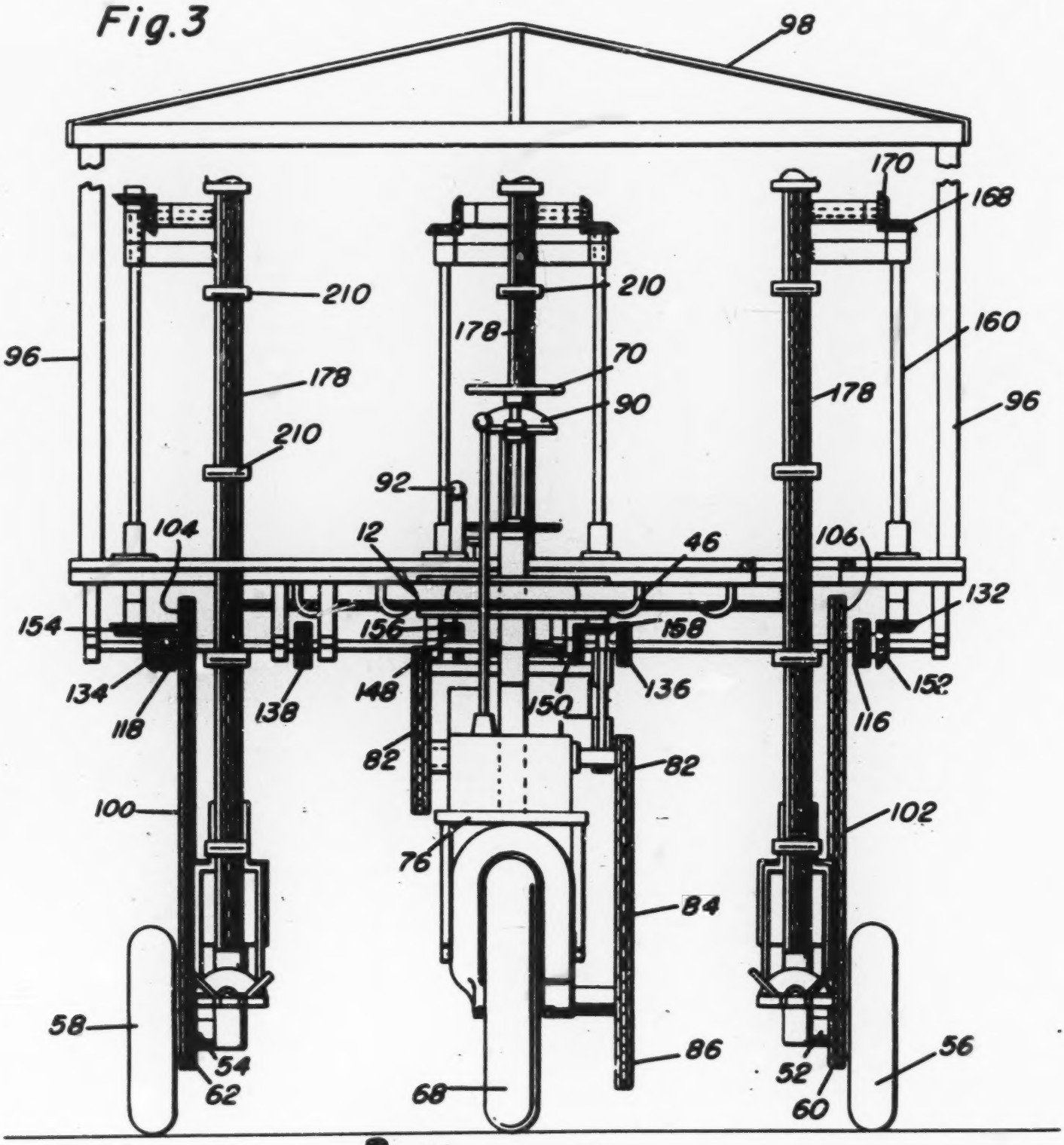
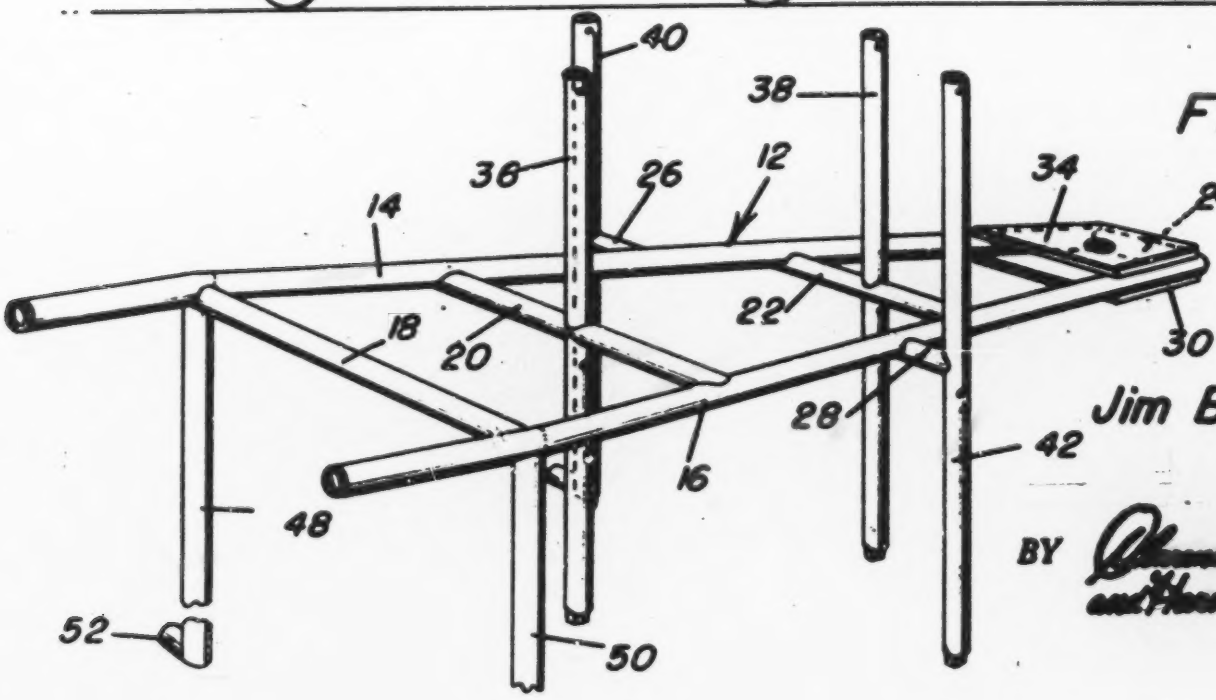


Fig.4



Jim B. Holliday
INVENTOR.

BY [signature] and Harvey B. Jordan
Attorneys

March 16, 1954 J. B. HOLLIDAY 2,672,248

TOBACCO HARVESTER

Filed Oct. 9, 1953 4 Sheets-Sheet 4

Fig. 5

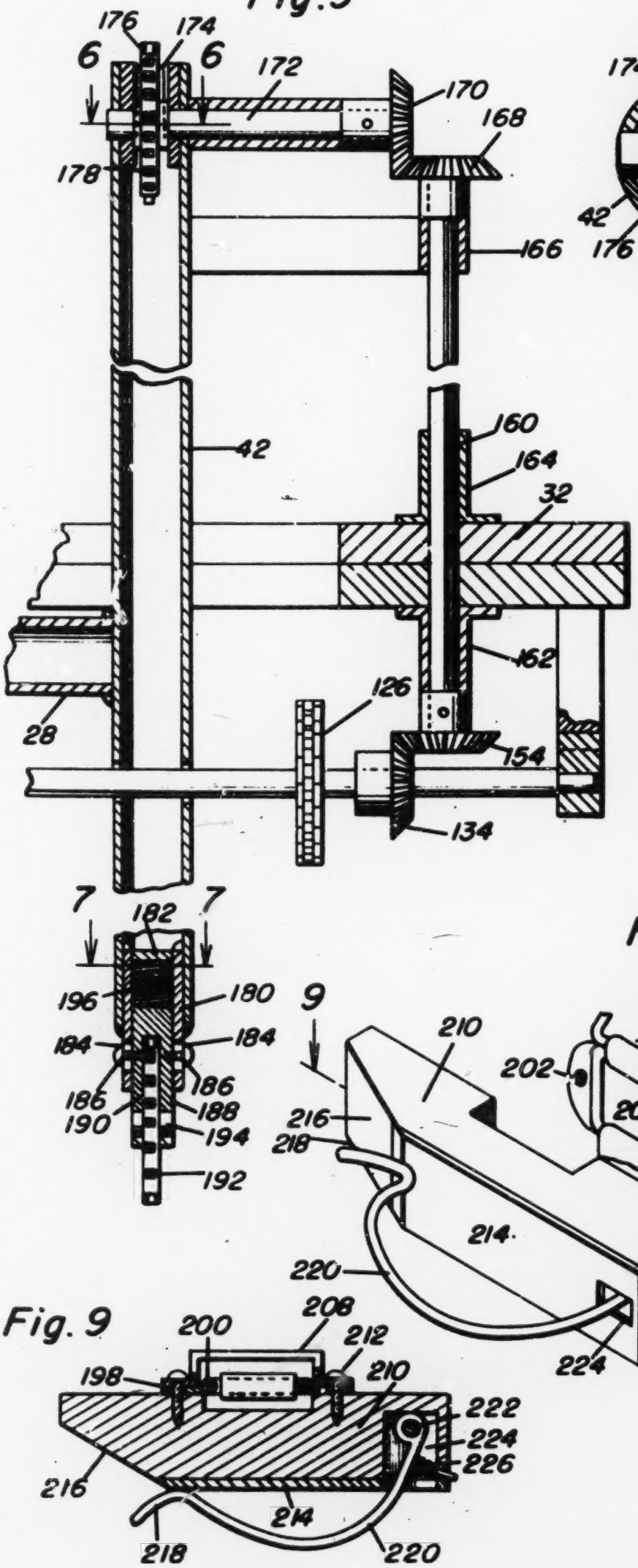


Fig. 6

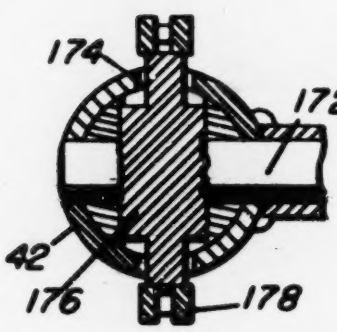


Fig. 7

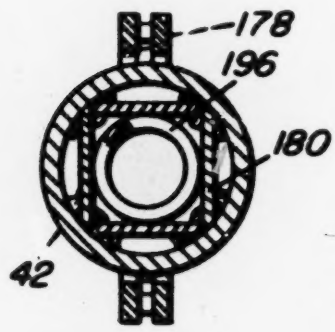


Fig. 10

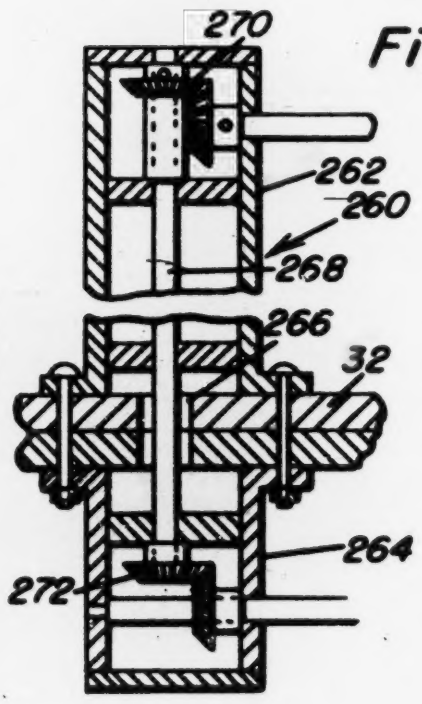


Fig. 8

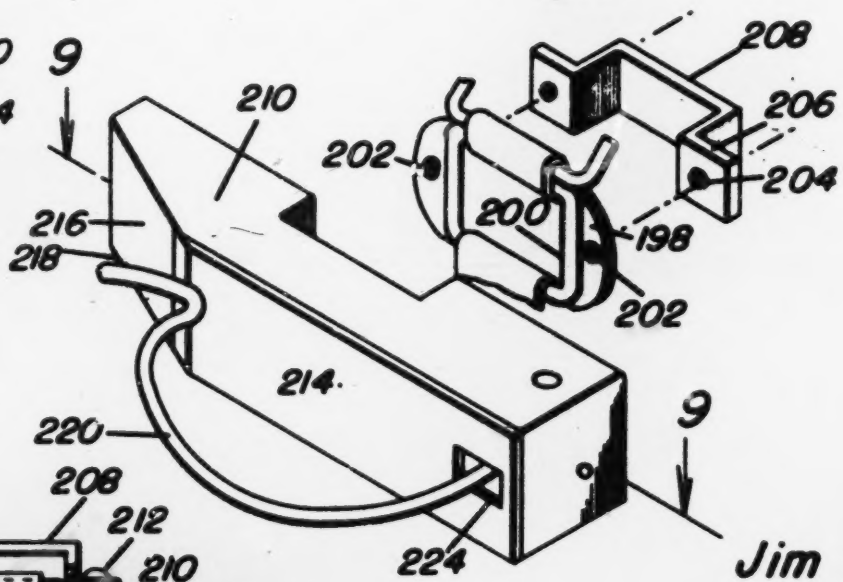


Fig. 9

Jim B. Holliday
INVENTOR.

BY Thomas A. O'Brien and Henry R. Jamison
Attorneys

Patented Mar. 16, 1954 2,672,248

UNITED STATES PATENT OFFICE

2,672,248

TOBACCO HARVESTER

Jim B. Holliday, Jamesville, N. C.

Application October 9, 1953, Serial No. 385,051

7 Claims. (Cl. 214—357)

1

This invention relates to an agricultural implement and more particularly to a novel tobacco harvester.

As it is well known, tobacco leaves must be picked by hand since only certain leaves of each plant are sufficiently matured for harvesting. Therefore, the present invention incorporates means for supporting and seating at a correct level and comfortable manner, the seats being positioned adjacent vertically extending conveyor chains for carrying the tobacco leaves upwardly to an upper level where there is provided an apparatus, as disclosed in the co-pending application, Serial No. 395,459, filed December 1, 1953, for Tobacco Stick Tying Apparatus.

Another feature of the invention resides in the provision of a tobacco harvester having an upper platform for supporting the operator of the vehicle so that he may both operate the harvester while supervising the operation of the tobacco leaf pickers and other personnel carried by the harvester.

Another object of this invention resides in the provision of vertically extending members for supporting vertically extending conveyor chains adjacent seats for leaf pickers, the seats being suspended from the vertical members adjacent to and behind the conveyor chains.

One form of this invention includes the concept of resiliently mounting the conveyor chain so as to prevent accidents should the fingers of the leaf picker or portions of his clothing become caught in the conveyor chains.

Another form of the invention includes the concept of having concentric and coaxial tubular vertical members and driven shafts for actuating the conveyor chains whereby the leaf pickers will be protected from the rotating shafts.

The conveyor chains utilized in this invention extend vertically from below the upper platform to a point thereabove and have attached thereto clips for holding the tobacco leaves and conveying them upwardly. These clips are preferably formed from brass or covered therewith to resist the deleterious action of the juices exuded from the tobacco leaves which causes the leaves to otherwise adhere to the clips.

Another feature of the invention resides in the provision of drive means for the conveyor chains which may be operated from sprockets mounted on the wheel axles of the harvester whereby the conveyors on either side or both sides may be operated individually or simultaneously.

Yet another object of this invention resides in the provision of means for adjustably support-

2

ing seats at a given height above the ground whereby the picket may more comfortably pick tobacco leaves from the tobacco plants, the height at which the seats are adjusted being dependent upon the approximate height of the mature leaves.

Still further objects and features of this invention reside in the provision of a tobacco harvester that includes a front wheel drive for self propulsion whereby the operator of the harvester can be seated at the front end of the harvester for steering and controlling the operation thereof. The harvester comprising the present invention is strong and durable, relatively simple in construction and manufacture, while being highly effective in positioning the leaf picker adjacent the crop.

These, together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a side elevational view of the tobacco harvester comprising the present invention;

Figure 2 is a bottom plan view illustrating in particular the fundamental relationship of the part of the invention and the manner in which the chain drive system provides means for operating the conveyor chains;

Figure 3 is a front elevational view of the harvester;

Figure 4 is a perspective view illustrating the construction of the frame and associated vertical members;

Figure 5 is an enlarged sectional detail view illustrating the construction of the vertical members and associated driving means for the conveyor chains;

Figure 6 is a sectional detail view as taken along the plane of line 6—6 in Figure 5;

Figure 7 is a horizontal sectional detail view as taken along the plane of line 7—7 in Figure 5 and illustrating the means for resiliently mounting the conveyor chains relative to the vertical members;

Figure 8 is an exploded perspective view illustrating the construction of one of the resilient clips utilized in carrying the tobacco leaves;

Figure 9 is a sectional view as taken along the plane of line 9—9 in Figure 8; and

Figure 10 is a sectional detail view illustrating

a modified form of a vertical member and drive means for the conveyor chains.

With continuing reference to the accompanying drawings wherein like reference numerals designate like parts throughout the various views, reference numeral 10 designates the tobacco harvester comprising the present invention. The tobacco harvester is provided with a main frame 12, the structure of which can be best seen in Figure 4. The frame 12 includes a pair of side frame members 14 and 16 which are joined by transverse members 18, 20, 22, and 24, the transverse members being substantially horizontal as are the horizontal members 26 and 28. The base plate 30 is secured to the frame 12 at the front end thereof, it being noted that the side frame member 14 and 16 converge forwardly. An upper platform 32 is secured on the frame 12 and provides means for supporting various personnel on the harvester. A supporting plate or platform 34 is provided for the front end of the frame and for supporting both the operator of the tractor and the various control mechanisms utilized in operating the tractor.

Welded or otherwise secured to the transverse members 20 and 22 and the horizontal members 26 and 28 are vertical members 36, 38, 40 and 42, which are preferably tubular in shape. These vertical members 36, 38, 40 and 42 provide the main structural supports for the conveyor chains of the invention.

The platform 32 is formed with a plurality of transverse ribs 44 forming the strength members of the platform 32. Other floorboards or the like may be secured on ribs 44 to complete the platform. The platform 32 is secured to the frame 12 by means of U-bolts 46 extending through the ribs 44 and embracing the side frame members 14 and 16, or any of the transverse members 18, 20, 22, or the horizontal members 26 and 28.

Welded to the frame 12 are a pair of downwardly extending standards 48 and 50. Stub axles 52 and 54 are secured to the standards 48 and 50 and carry stub shafts on which rear wheels 56 and 58 are mounted as well as sprockets 60 and 62. The sprockets 60 and 62 provide means for operating the chain drive arrangements forming important elements of the invention.

For providing self propulsion for the invention there is provided a vertically extending standard 64 which is journaled in the plates 30 and 32 of the frame 12 and which carries an axle 66 on which a front wheel 68 is journaled. The standard 64 may be rotated by means of a steering wheel 70 which is connected by a spur 72 and gear 74 arrangement. Mounted on the standard 64 is a bracket 76 supporting a gasoline engine 78 which is connected by suitable endless belts 80 and chains 82 and 84 together with the associated pulleys on sprockets to drive a large sprocket 86 mounted on the shaft carrying the wheel 68, the shaft providing the means for journaling the wheel 68 in the axle 66. The shaft is designated by reference numeral 88. A seat 90 is provided for the operator of the vehicle adjacent the steering wheel 70 and clutch operating mechanism 92 together with an accelerator pedal 94 are placed adjacent the seat 90 so that the operator may more easily control the operation of the harvester.

By means of suitable post or standards such as are indicated at 96, a canopy 98 of suitable construction, preferably light in weight is supported above the platform 32 thereby providing shade for the personnel of the tractor while also providing some protection against inclement weather.

The sprockets 60 and 62 have entrained thereon endless chains 100 and 102 which are entrained about sprockets 104 and 106 mounted on stub shafts, each of which carry a friction plate clutch assembly, as at 108, and 110, to drive stub shafts 112 and 114 carrying sprocket wheels about which the endless chains 116 and 118 are positioned. Thus, the power take-off from the sprockets 60 and 62 can be controlled by the personnel of the planter using clutch actuating levers 120 and 122.

The endless chains 116 and 118 drive sprockets 124 and 126 mounted on shafts 128 and 130 carrying beveled gears 132 and 134. The shafts 128 and 130 also have sprockets, as at 133 and 135 mounted thereon for driving endless chains 136 and 138 which are also entrained about the sprockets 140 and 142 mounted on shafts 144 and 146. The shafts 144 and 146 carry bevel gears 148 and 150, respectively.

It is thus noted that there may be selectively rotated the beveled gears 132 and 134 and 148 and 150 all of which rotate about the horizontal axis and which are adapted to drive beveled gears 152, 154, 156 and 158 mounted on vertically extending shafts for driving vertical conveyor chains, each of which is substantially identical in construction and which for the purpose of simplicity and clarity can be best described with particular attention being had to Figure 5.

The vertically extending shafts as represented by reference numeral 160 are journaled in bearings 162 and 164 above and below the platform 32 and in bearing supports 166 extending outwardly from the vertical member. The shaft 160 carries a beveled gear 168 adapted to engage another beveled gear 170 mounted on a shaft 172 journaled in the vertical member 42. It is noted that the upper end of the tubular vertical member 42 is provided with a recess 174 therein for reception of the upper sprocket 176 about which the endless conveyor chain 178 is entrained. At the lower end of the tubular vertical member 42 there is welded or otherwise attached a square tubular housing 180 provided with an upper end wall 182. Slots, as at 184, are provided in the housing 180 for reception of guides 186 mounted on a slide block 188 having a recess 190 therein for reception of the lower sprocket 192 mounted on a shaft 194 journaled in the slide block 188. A spring 196 continuously biases the upper wall 182 of the housing 180 and the slide block 188 so that the conveyor belt 178 may be held taut, the block 188 being capable of upward motion upon compression of the spring 196 should the fingers of a picker or a portion of his clothing or the like, become entangled in the conveyor chains 178.

It is noted that the conveyor chains 178 are composed of links which are loosely rotatably connected to each other in the conventional manner. Mounting brackets, as at 198, are attached to some of the links 200 and are provided with apertures 202 therethrough for reception of fasteners which extend through apertures 204 and the flanges 206 of the substantially U-shaped retainers 208 used for attaching the plates 198 to resilient clips 210. The fasteners utilized in attaching the retainers 208 and the brackets or plates 198 to the clips 210 may be in the form of screws or nails or the like, as indicated at 212. The spring clips 210 are formed of wood with a

facing 214 of brass or may be constructed entirely from brass since such material is resistant to corrosive effect of the juices exuded from the tobacco leaves capable of being carried by the clips 210. The body of the clip 210 includes a block provided with a cam face 216 which cooperates with the cam portion 218 of a pivotally mounted clip wire 220 mounted on a shaft 222 within a recess 224 in the clip body. A spring 226 is provided for continuously urging the clip wire 220 into engagement with the facing 214 so that the tobacco leaves will continuously be resiliently held.

The tobacco leaves are inserted into the clips 214 by pickers seated on seats, as indicated at 228, 230, 232, and 234 suspended from the vertical members 36, 38, 40 and 42, respectively. The seats 228, 230, 232 and 234 are mounted on durable frame-works 236, 238, 240 and 242 carried by vertically extending brackets such as designated at 244 in Figure 1 which are attached by bolts 246 to the vertical members 36, 38, 40 and 42. A plurality of apertures are formed in the vertical members 36, 38, 40 and 42 so that the vertical brackets 244 may be adjustably secured to the vertical members thereby raising or lowering the seats 28, 30, 32 and 34 as may be desired in order to position the picker, as indicated at A, depending upon the state of the tobacco crop. Foot rests 248 are associated with each of the seat supporting frames 236, 238, 240 and 242.

The operation of this machinery is quite simple. After the clutches have been placed in an operative position using the levers 120 and 122, and with the motor 76 driving the harvester, the harvester will move at a rate approximately 2 miles or so per hour. This will actuate the sprockets 60 and 62 driving the chain drive means for actuating the conveyor chains 178. All that is necessary for a picker to do is to insert the stems of the tobacco leaves in the clips 210 and the conveyor chains 178 will hoist the tobacco leaves above the platform 32 whereby subsequent mechanisms and personnel will be utilized to tie the tobacco leaves to tobacco sticks.

A modified form of the tubular vertical members is illustrated in Figure 10 and it is noted that this vertical member 260 is formed of two sections 262 and 264 which are bolted or otherwise fastened to the platform 32 which is apertured as at 266 for reception of a vertical shaft 268. The shaft 268 is thus received within the tubular vertical member 260 thus providing protection for the leaf picker while protecting the shaft. The shaft 268 has bevel gears 270 and 272 thereon for driving other bevel gears on driven shafts for the sprockets of the conveyor chains.

From the foregoing, the construction and operation of the device will be readily understood and further explanation is believed to be unnecessary. However, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the appended claims.

What is claimed as new is as follows:

1. A tobacco harvester comprising a frame, said frame including a pair of spaced side frame members, horizontal frame members secured to said side frame members, spaced vertical members secured to said horizontal frame members, endless conveyor chains carried by said vertical members, and wheel mounting elements secured to said frame, wheels mounted on said elements, drive sprockets mounted on said elements and driven by said wheels, and means connecting said sprockets with said chains to actuate said chains, drive shafts rotatably mounted on said frame carrying driven sprockets, chain drive systems connecting said drive sprockets with said driven sprockets to actuate said drive shafts, said chain drive systems including bevel gears on said drive shafts, driven shafts journaled in said vertical members, other bevel gears on said driven shafts engaging said first recited bevel gears to drive said driven shafts, said conveyor actuating sprockets being mounted on stub shafts and means drivingly connecting said driven shafts with said stub shafts.

2. A tobacco harvester comprising a frame, said frame including a pair of spaced side frame members, horizontal frame members secured to said side frame members, spaced vertical members secured to said horizontal frame members, endless conveyor chains carried by said vertical members, and wheel mounting elements secured to said frame, wheels mounted on said elements, drive sprockets mounted on said elements and driven by said wheels, and means connecting said drive sprockets with said chains to actuate said chains, drive shafts rotatably mounted on said frame carrying driven sprockets, chain drive systems connecting said drive sprockets with said driven sprockets to actuate said drive shafts, said chain drive systems including bevel gears on said drive shafts, driven shafts journaled in said vertical members, other bevel gears on said driven shafts engaging said first recited bevel gears to drive said driven shafts, said conveyor actuating sprockets being mounted on stub shafts and means drivingly connecting said driven shafts with said stub shafts, said vertical members being tubular in construction and supporting conveyor actuating sprockets about which said chains are entrained.

3. A tobacco harvester comprising a frame, said frame including a pair of spaced side frame members, horizontal frame members secured to said side frame members, spaced vertical members secured to said horizontal frame members, endless conveyor chains carried by said vertical members, and wheel mounting elements secured to said frame, wheels mounted on said elements, drive sprockets mounted on said elements and driven by said wheels, and means connecting said drive sprockets with said chains to actuate said chains, drive shafts rotatably mounted on said frame carrying driven sprockets, chain drive systems connecting said drive sprockets with said driven sprockets to actuate said drive shafts, said chain drive systems including bevel gears on said drive shafts, driven shafts journaled in said vertical members, other bevel gears on said driven shafts engaging said first recited bevel gears to drive said driven shafts, said conveyor actuating sprockets being mounted on stub shafts and means drivingly connecting said driven shafts with said stub shafts, said vertical members having seats suspended therefrom behind said chains.

4. A tobacco harvester comprising a frame, said frame including a pair of spaced side frame members, horizontal frame members secured to said side frame members, spaced vertical members secured to said horizontal frame members, endless conveyor chains carried by said vertical members, and wheel mounting elements secured to said frame, wheels mounted on said elements, drive sprockets mounted on said elements and driven

by said wheels, and means connecting said drive sprockets with said chains to actuate said chains, drive shafts rotatably mounted on said frame carrying driven sprockets, chain drive systems connecting said drive sprockets with said driven sprockets to actuate said drive shafts, said chain drive systems including bevel gears on said drive shafts, driven shafts journaled in said vertical members, other bevel gears on said driven shafts engaging said first recited bevel gears to drive said driven shafts, said conveyor actuating sprockets being mounted on stub shafts and means drivingly connecting said driven shafts with said stub shafts, said chains having spring pressed clips attached thereto for resiliently engaging and carrying tobacco leaves.

5. A tobacco harvester comprising a frame, said frame including a pair of spaced side frame members, horisontal frame members secured to said side frame members, spaced vertical members secured to said horisontal frame members, endless conveyor chains carried by said vertical members, and wheel mounting elements secured to said frame, wheels mounted on said elements, drive sprockets mounted on said elements and driven by said wheels, and means connecting said drive sprockets with said chains to actuate said chains, drive shafts rotatably mounted on said frame carrying driven sprockets, chain drive systems connecting said drive sprockets with said driven sprockets to actuate said drive shafts, said chain drive systems including bevel gears on said drive shafts, driven shafts journaled in said vertical members, other bevel gears on said driven shafts engaging said first recited bevel gears to drive said driven shafts, said conveyor actuating sprockets being mounted on stub shafts and means drivingly connecting said driven shafts with said stub shafts, said chains having spring pressed clips attached thereto for resiliently engaging and carrying tobacco leaves, each of said clips having a clip block, a clip wire pivotally secured to said clip block and having a retaining portion adapted to hold tobacco leaves between said clip wire and said clip block, and resilient means urging said clip wire and said clip block together, said clip wire and said clip block having diverging outer cam portions for enabling insertion of tobacco leaves therebetween while said conveyor chains are in continuous motion.

6. A tobacco harvester comprising a frame, said frame including a pair of spaced side frame members, horisontal frame members secured to said

side frame members, spaced vertical members secured to said horisontal frame members, endless conveyor chains carried by said vertical members, and wheel mounting elements secured to said frame, wheels mounted on said elements, drive sprockets mounted on said elements and driven by said wheels, and means connecting said drive sprockets with said chains to actuate said chains, drive shafts rotatably mounted on said frame carrying driven sprockets, chain drive systems connecting said drive sprockets with said driven sprockets to actuate said drive shafts, said chain drive systems including bevel gears on said drive shafts, driven shafts journaled in said vertical members, other bevel gears on said driven shafts engaging said first recited bevel gears to drive said driven shafts, said conveyor actuating sprockets being mounted on stub shafts and means drivingly connecting said driven shafts with said stub shafts, said vertical members being tubular in construction and supporting conveyor actuating sprockets about which said chains are entrained, said vertical members having seats suspended therefrom behind said chains.

7. A tobacco harvester comprising a frame, wheels supporting said frame, vertical members secured to said frame in spaced relationship to each other, vertically extending conveyor chains carried by said vertical members, drive means for actuating said chains, a platform secured on top of said frame, said chains extending upwardly above said platform from therebelow, said chains having spring pressed clips attached thereto for resiliently engaging and carrying tobacco leaves, a plurality of seats, and means adjustably suspending said seats from said vertical members in back of said chains.

JIM B. HOLLIDAY.

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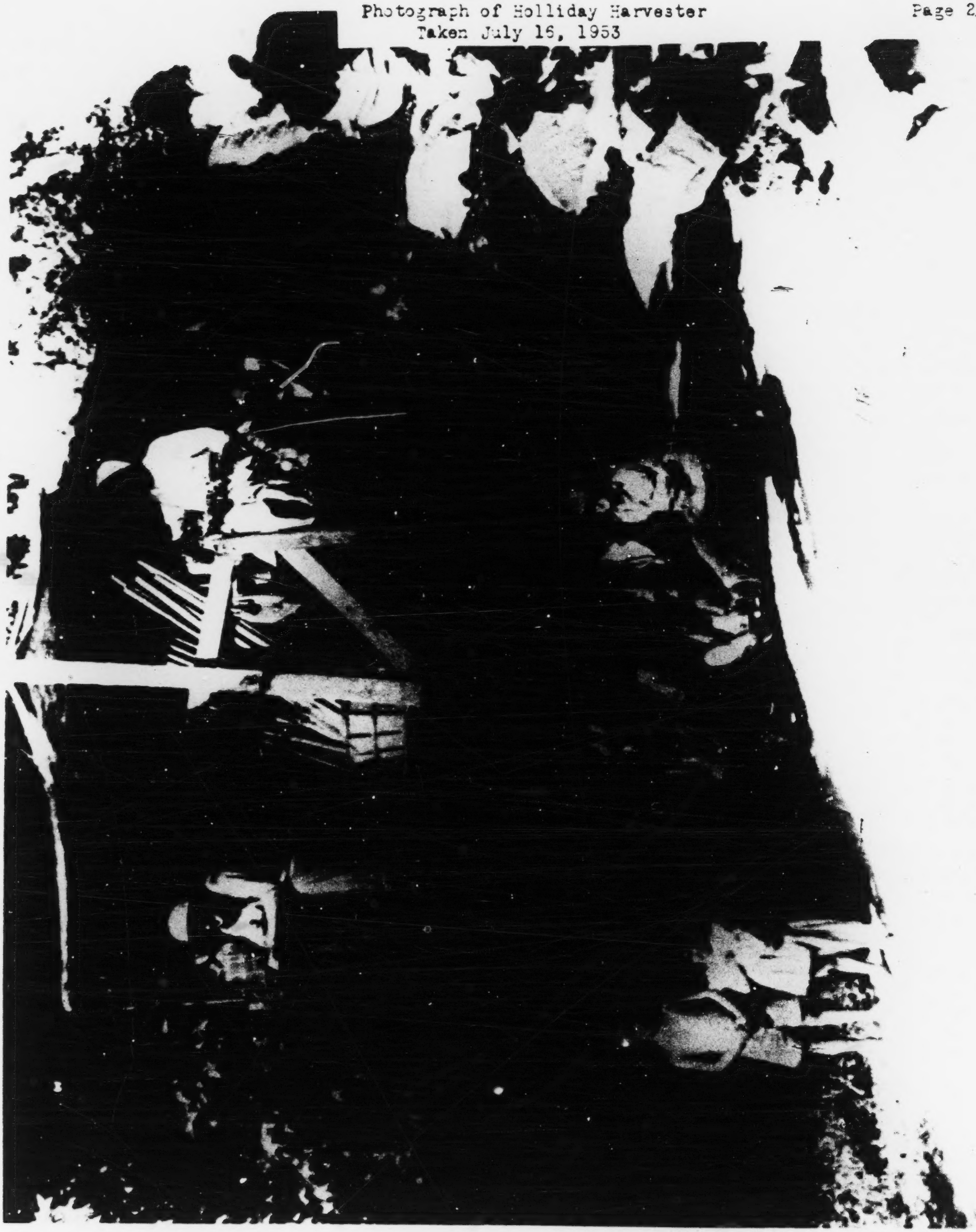
HOLLIDAY EXHIBIT 1
Photograph of Holliday Harvester
Taken July 16, 1953



HOLLIDAY EXHIBIT 4
Issue of "The Enterprise"
of July 16, 1953

Williamston, Martin County, North Carolina, Thursday, July 16, 1953

Main Street Bus Terminal Closed Here This Week

Belk-Tyler Company Plans Construction Of Store On Station Site

Williamston's bus terminal, located on Main Street near the Washington Street intersection for a number of years, was closed late Tuesday evening to make room for the construction of a modern store building for Belk-Tyler

Resident Manager Ernest Mears said yesterday that plans for the store had been completed, that possibly bids would be called for shortly However, no definite information has been released by the home office in connection with project developments.

The closing of the terminal to bus operations has been pending for some time, but the dead line Tuesday evening left the operators with no place to go. The busses, operated by the four companies, used the site, but the station doors were closed to the public. No tickets were sold and bus express service was continued for the day Passengers searched around for the best accommodations available.

Representatives of the company were contacted twice during the day yesterday, but no official statement could be had from them.

However, rumors were heard from various sources. It was reported that the terminal would be located ,temporarily at least, on Washington Street next to the Carolina Warehouse. Accommodations there could not be checked there immediately, but apparently the bus operators plan to use the old Greene Oil Company filling station as an office and waiting room

Several company officials, including Assistant Traffic Manager Richardson were here most of yesterday, but if they selected a

Georgia Tobacco Markets Holding First Sale Today

Prices Little Changed From Those Reported On The 1952 Opening

The twenty-three tobacco markets in the Georgia-Florida belt held their first sales of the current season this morning, preliminary reports declaring opening-day prices were little changed from those recorded on the first day of the 1952 marketing season. Producting an estimated 150,000,000 pounds, the Georgia farmers claim they have one of the best quality crops in several years.

Early estimates pointed to an average of about 52 cents for the belt, a figure slightly above the 49.5 cents reported on opening day last year.

Prices were ranging from five to 68 cents a pound during the morning.

A direct report from Mr. E. G. Anderson, warehouse operator on the Moultrie market, gave the official average there for the first two selling hours at $51.60. Mr. Anderson said that the quality there was only fair, that while there was some good tobacco on the floors, most of the first-day offerings were harvested ahead of the rains. "We are expecting better quality leaf from now on out," Mr. Anderson said at noon today.

Considering the drop of about three cents a pound in the support price, farmers were well pleased with their first sales, Mr. Anderson explained

A report on early sales at Valdosta placed the general average

(Continued From Page Six)

Supply Of Gamma Globulin Limited

Tobacco In This A Leaf Spot Threat

HARVESTER

One of the most unique machines placed in use on a farm in this county is now operating in the tobacco fields on the Holliday farms in Jamesville Township.

Designated "The Thing", the tobacco harvester has promise, and its designer-maker, Jim Brown Holliday, is well pleased with the first operations.

Manned by nine persons, the machine takes the tobacco from the stalk, bundles it for the looper who stacks it away for transfer to a waiting vehicle.

It can harvest between 1200 and 1500 sticks per day, and the work is not strenuous, the workers declare.

Predicts China's Millions Plan To Revolt Eventually

Not Satisfied With Communism And Not Interested In Kaishek

By EDWARD H. SIMS
Washington Correspondent

Washington. -The fate of China and the hardships of China's people, are a lesson for all world students to observe, according to That editor Sang Ad Bangchong-Silpa, now touring the United States as guest of our government. Mr. Silpa has a first-hand knowledge of the Chinese picture, for several million Chinese live in Thailand. Many have relatives in China and at one time Thai-

Disease Ca Much Conc This Count

Appeared In All This Immediat Almost Overn

Leaf spot joined oth and pests almost o threaten the tobacco county, reports teachin terday and today de farmers are greatly al the potential damage inability to cope wit recent threat

Traced to excess nitr leaf tissues, the spots ernight, striking close No larger than a ma first, the spot beco quickly and spreads to spots, causing portions to rot and fall out. H plain that the leaf sp ing the curing process ing the quality.

The spot, having a pearance at first, was a limited portion of Farmer John Whitley ago, but it was not week that the spot app extensive scale, late claring that it was "pe all over county and f the fields to the othe limited to the leaves o section of the stalk, l from top to bottom, plained

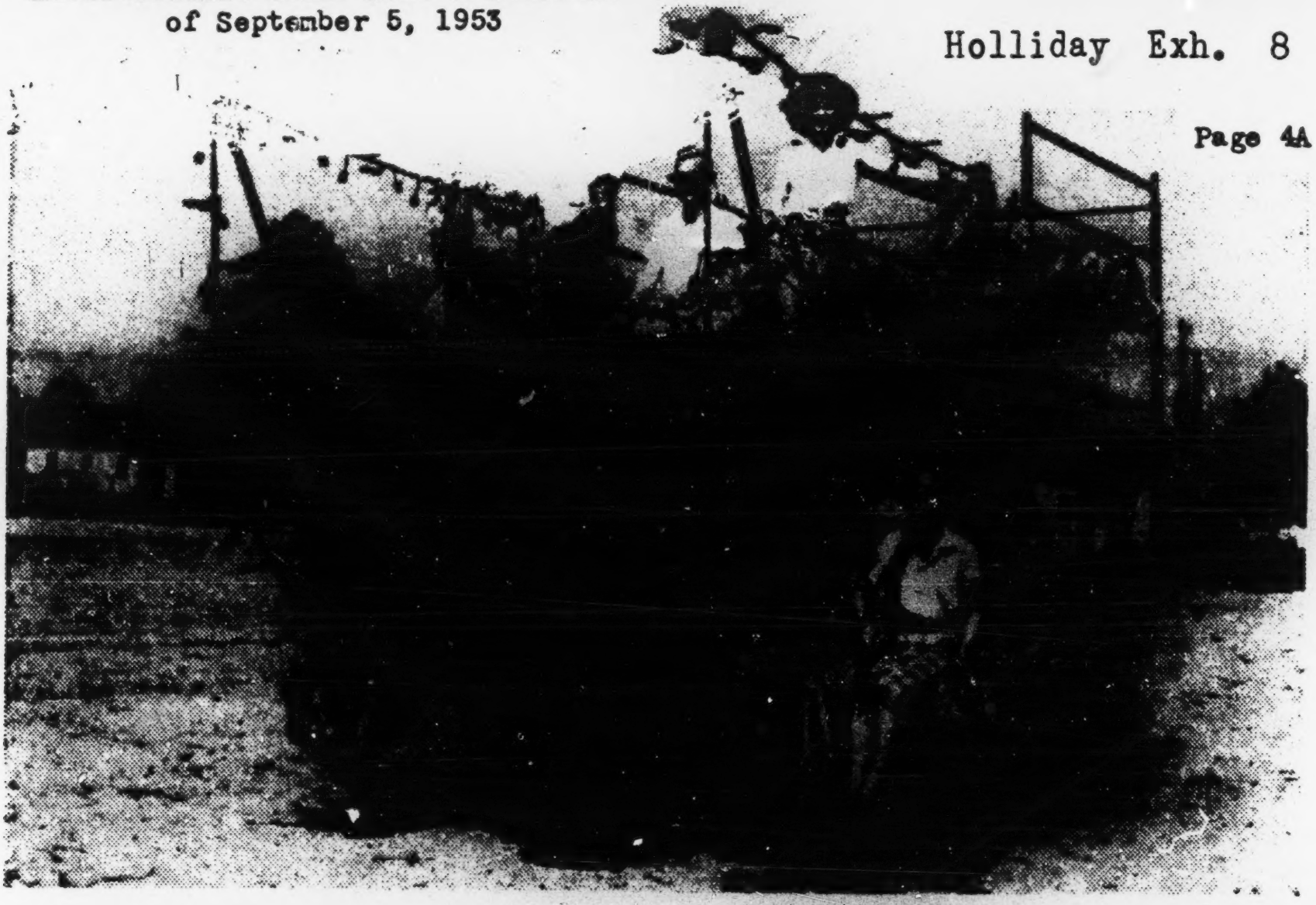
If the tobacco is ha fore the spot becomes the cured leaf shows t one farmer said

Concerned about the

See the GREATEST development in tobacco harvesting in 100 years!

Advertisement from "News & Observer"
of September 5, 1953

Holliday Exh. 8



The Silent Flame tobacco harvester is shown above. Seven people can put-in from 800 to 1,000 sticks of tobacco per day. That's all of the help required to do the complete job. The machine is self-propelled and racks shown at the back will carry 125 sticks of tobacco.

FIRST PUBLIC DEMONSTRATION

Silent Flame 7/3

HOLLIDAY EXHIBIT 9
Cut of Roanoke-Holliday Harvester

Roanoke-Holliday Moves Even Further Out Front!

Yes, Roanoke-Holliday Announces the New

VARIABLE-HEIGHT, DELAYED-ACTION UNLOADING STATION!

One of the Greatest Production Advances In the Tobacco Harvester!

Through extensive research Harrington Manufacturing Company has found that a longer chain at the looping station was needed for loopers to more efficiently take tobacco from the conveyor — particularly when it's necessary to change sticks. Also it was noted that a variance was needed in the height of the conveyor to meet the varying heights of loopers.

With this improvement in mind, Harrington Manufacturing Company announces this sensational **VARIABLE-HEIGHT, DELAYED-ACTION, UNLOADING STATION** to offer approximately one-third more time to loopers, thereby practically eliminating damaged tobacco, missed tobacco obstructing the primer and droppage from tobacco being missed by loopers.

The **VARIABLE-HEIGHT, DELAYED-ACTION, UNLOADING STATION** is not a slowing-up process as the chain passes the looper at the same speed as former models, but yet travels one-third further in the unloading station, giving the looper approximately one-third more time without altering the compact design of the working area.

And it's adaptable to your height — it can be conveniently operated by either short, medium or tall loopers with equal ease and comfort by affording a change of position. Be sure you see this new feature on the . . .

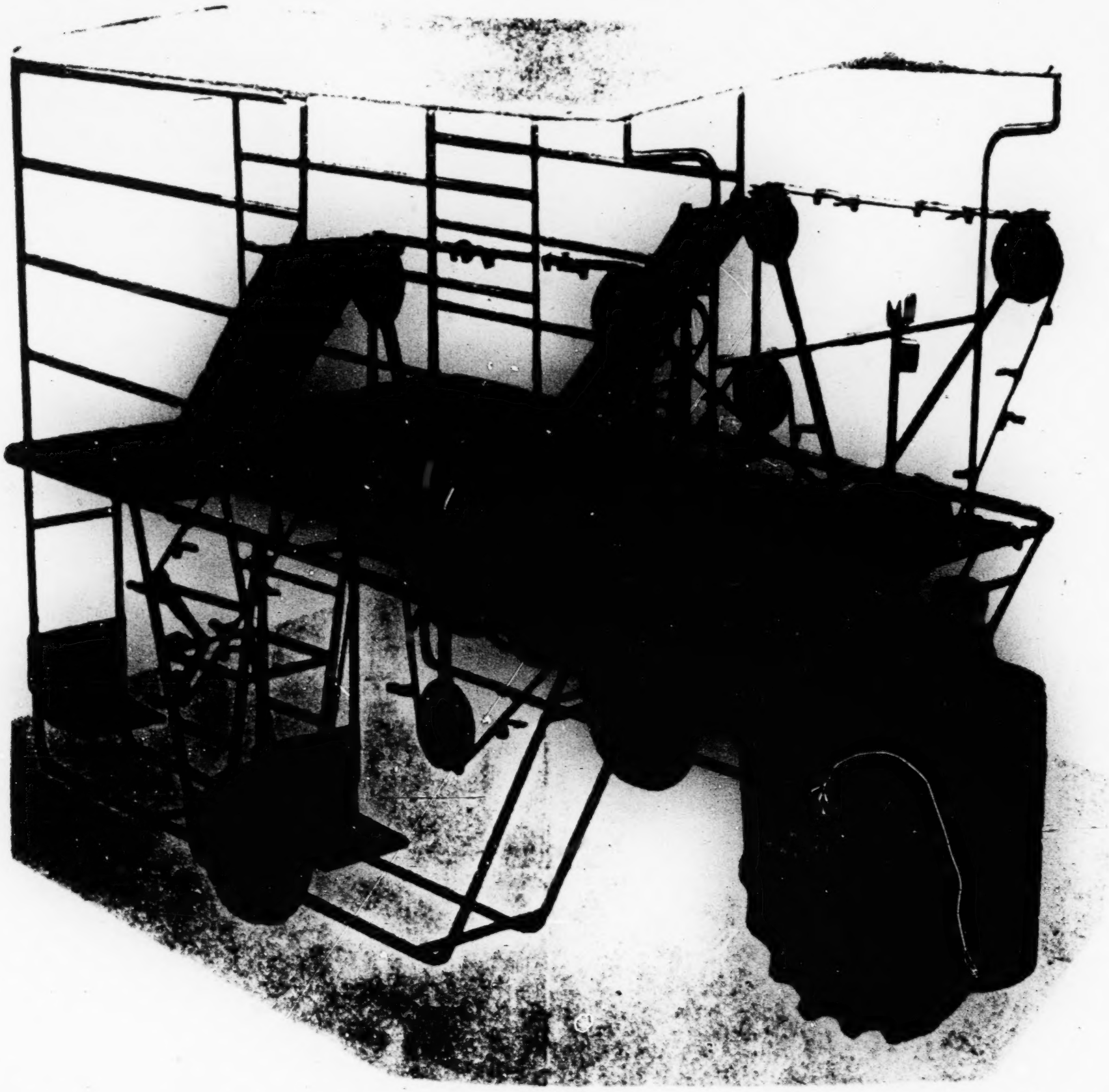
ROANOKE-HOLLIDAY TOBACCO HARVESTER!

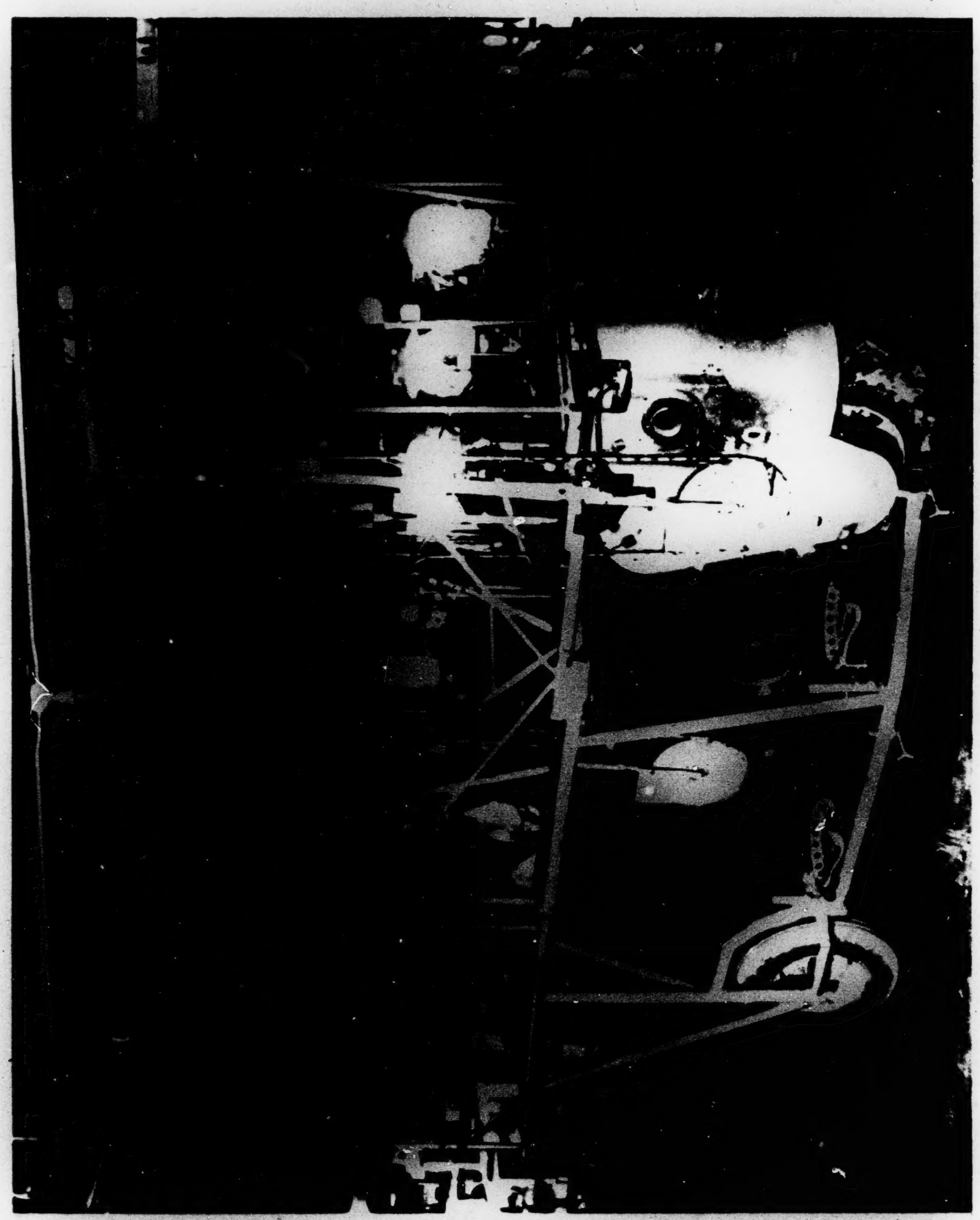
The ROANOKE Holliday

Harrington Manufacturing Co., Lewiston, N. C.

HOLLIDAY EXHIBIT 10
Portion of Advertising Leaflet
of Silent Flame Harvester, 1954 Model

DEVELOPMENT IN TOBACCO GROWING





EXCERPT FROM pp. 51, 52. HOLLIDAY PATENT FILE

Letter to Examiner, January 7, 1954

Sir:

Responsive to the Office Action of December 22, 1953, please amend the above entitled application as follows:

Please add Claim 23 as follows:

* * * * * * *

REMARKS

* * * * * * *

Claim 22 was rewritten as newly presented Claim 23 in order to avoid the grounds of rejection posed by the Examiner. In Claim 23 it is now defined that the chains have spring pressed clips attached thereto for resiliently engaging and carrying tobacco leaves. There is further defined that the seats are suspended from the frame behind the chains. Additionally, conveyor actuating sprockets are recited as being supported by the vertical members with the chains being entrained about the sprockets. Thus, Claim 23 defines a structure which patentably distinguishes from the prior art.

* * * * * * *

Respectfully submitted,

JIM B. HOLLIDAY
CLARENCE A. O'BRIEN and
HARVEY B. JACOBSON, *Attys.*
By /s/ HARVEY B. JACOBSON

KSG/pc
Washington, D. C.
January 4, 1954

EXCERPT FROM p. 54, HOLLIDAY PATENT FILE

Letter From Examiner, Jan. 20, 1954

Responsive to amendment filed January 4, 1954.

In the amendment to claim 21, line 8, "a plurality of sheets" should be changed to *a plurality of seats.* With this change the claim will be allowable.

Claim 23 is rejected as unpatentable over Whitley in view of Jones, Owen or Stark.

Whitley shows a vehicle used to harvest tobacco including lower seats 66 and an upper seat 281. The tobacco is manually passed to the operator in the upper seat. Invention would not be involved in using a conveyor to elevate the tobacco to the upper station in view of the teachings of Jones or Stark. Jones' hooks 29 could be replaced by spring clips, as shown by Owen, without involving invention. Owen shows sprockets 22 used to drive the chain elevator 23. The seats 66 of Whitley could be suspended from the frame 10 without involving invention.

Claims 9, 10, 12, 14, 17 and 18 appear allowable.

This rejection is made *Final.*

MTemin/aw

/s/ E. A. Fuller
Examiner

EXCERPT FROM p. 55. HOLLIDAY PATENT FILE

Letter to Examiner, Jan. 29, 1954

Sir:

Responsive to the office action of January 20, 1954, please amend the above entitled application as follows:

Claim 21, line 9, change "a plurality of sheets" to—a plurality of seats—.

Please cancel claim 23.

—Remarks—

Claim 23 has been transferred to applicant's co-pending application in view of the applicant's desire for early allowance of this application. Hence, since claims 9, 10, 12, 14, 17 and 18 were held by the Examiner to appear to be allowable and in view of the fact that the Examiner has held that claim 21 would be allowable with the term "a plurality of sheets" changed to —a plurality of seats—, a further action resulting in the passing of this case to issue is now believed to be in order, and such favorable action is courteously solicited. The interview of January 26, 1954 was greatly appreciated and is made of record.

Respectfully submitted,

Jim B. Holliday
Clarence A. O'Brien &
Harvey B. Jacobson, *Attorneys*

By /s/ Harvey B. Jacobson

Washington, D. C.
January 27, 1954
KSG/ahp

EXCERPT FROM p. 106. LONG PATENT FILE

Letter From Examiner, January 7, 1954

The following claim found allowable is suggested for the purpose of interference. Applicant should make the same by March 7, 1955 under the provisions of Rule 203 failure to do so will be considered a disclaimer of the subject matter involved.

"A tobacco harvester comprising a frame, wheels supporting said frame, members secured to said frame in spaced relationship to each other, conveyor chains carried by said members, drive means for actuating said chains a platform secured on top of said frame, said chains extending upwardly above said platform from therebelow said chains having spring pressed clips attached thereto for resiliently engaging and carrying tobacco leaves, a plurality of seats, and means adjustably suspending said seats, from said members in back of said chains."

The claim being proposed is a substantial duplicate of claim 7 of the Holliday patent #2672248, having omitted therefrom, the term "vertical" from lines 2, 5 and 12 and the terms "vertically extending" from line 4 of said claim as immaterial limitations.

The filing of this claim must be accompanied by an affidavit under Rule 204(b), Office Rules of Practice.

PArnold/aw

Examiner

EXCERPT FROM LONG PATENT FILE. pp. 112. 113. 114

Letter From Examiner, January 25, 1955

Responsive to Letter filed Jan. 13, 1955.

Applicant's request for "withdrawal of suggested claim" has been carefully reconsidered and is denied for the following reasons.

The contention by Applicant that patentee Holliday "accepted" a rejection of original claim 23 and canceled same appears to be in error. In paper #12, of the Holliday patent file, the cancelation of claim 23 is accompanied by the statement "claim 23 has been transferred to applicant's copending application in view of applicant's desire for early allowance of this application." The consequence of such action is not in issue here—however, it hardly constitutes an *acceptance* of a rejection of said claim on art.

Before proceeding with an explanation of how the claim reads on applicant's device, it may be well to call attention to the fact that counts of an interference are given as broad an interpretation as the devices involved will permit in the light of the prior art. Accordingly in the instant case the term "members" is not to be restricted to tubular elements merely because the Holliday upright "members" are tubular.

In reading the proposed claim on applicant's device the "frame" referred to is indicated by character 10; the wheels are 33, 48; the "members secured to said frame in spaced relationship to each other" are the skeletonized operator and conveyor supporting frameworks positioned adjacent each side of the frame 10 and comprise such elements as 15, 16, 25 and etc.; "conveyor chains" 123, 124 are carried by said members through sprockets 156, 157 secured to said "members" by brackets 158 on tubular bar 16; "drive means" 70 is provided for said chains; a "platform" 13 is secured on top of frame 10, and "said chains extend upwardly above said platform from therebelow"; spring pressed clips 133, 134 are carried by said chains "for resiliently engaging and carrying tobacco leaves";

a plurality of seats 26 are adjustably suspended by said member by means of sleeves 27 on uprights 25, 31 which constitute part of the spaced chain supporting "members".

The term "member" may define not only the framework which supports the conveyors below the platform 13, but also struts 147, 148 which support the conveyors above said platform. In view of the scope of the term "member" there seems to be little doubt that the suggested claim is readable on applicant's device.

In an effort to overcome the Holliday patent #2672248 as a reference, applicant filed an affidavit under Rule 131. Such affidavit is for the sole purpose of overcoming a reference as to subject matter disclosed *but not claimed.* Such, however, is not the case in this instance.

The claims of this case *in their present form* patentably differentiate from the Holliday patent. Therefore, no need for swearing behind the Holliday patent now exists. However, the Holliday patent has been cited against applicant's case and in order to properly dispose of its pertinency, examiner has proposed a claim defining subject matter common to both the patent and this application, which claim in view of claim 7 of the Holliday patent is considered allowable.

The difference between Holliday's claim 7 and the suggested claim is not believed material since there is little doubt that such difference would not constitute a patentable distinction.

If applicant is of the opinion (1) the proposed claim is not readable on his device or (2) the proposed claim is unpatentable, a disclaimer of said claim by failing to make same would appear to be in order.

The claims of this application (26 to 33) are considered allowable and patentably distinct from the claim proposed. Consequently the case may be passed for issue forthwith if applicant chooses not to make the claim suggested.

The date for making the suggested claim to avoid a disclaimer thereof, remains March 7, 1955.

Request denied.

PArnold/aw

Acting Examiner

EXCERPT FROM LONG PATENT FILE pp. 115, 116, 117, 118

IN THE UNITED STATES PATENT OFFICE

Division 4

In re Application of William R. Long; Serial No. 446,291; Filed: July 28, 1954; For: Tobacco Harvester.

Petition to the Commissioner, January 27, 1955

This is a petition to the Commissioner of Patents, in accordance with Rule 181, requesting that he exercise his supervisory authority in passing upon what is considered to be an erroneous holding by the Examiner, and since the Supervisor has already had some connection with the matter, it is requested that the Commissioner consider the matter personally or refer the same to the Solicitor in accordance with Rule 181 (g).

The basis of this petition is the Examiner's drafting of a claim for purpose of interference, such claim being carved from Claim 7 of the Holliday patent 2,672,248, issued March 16, 1954, on an application filed October 9, 1953.

It is respectfully submitted that the Examiner should not have suggested the claim as there is no occasion for the same, he has exceeded his authority and is undertaking to provoke litigation and increase the work load and expense of both the Patent Office and the applicant in so doing, the claim which he has suggested is distinctly different in scope and meaning from the claim of the patent, and if the claim is interpreted that broadly it defines no invention over the prior art as illustrated by the patents to Stark et al, 1,275,781 and Whitley, 2,518,965.

The present application and the Holliday patent each are directed to tobacco harvesters. There are no claims in the Holliday patent which can be made by the applicant or which can be read upon applicant's structure. Claim 7, which is probably the broadest, contains subject matter

specific to the Holliday structure and not disclosed by applicant, namely, spaced vertical members, supporting vertically extending conveyor chains and also adjustably suspending a plurality of seats for workmen. The Examiner has suggested a claim which he has broadened so that the members do not have to be vertical, the conveyor chains do not have to be vertical or supported on vertical members, and the seats do not have to be suspended from the same members whether vertical or not. This the Examiner has done by omitting "vertical" in lines 2, 5 and 12, and "vertically extending" in line 4. In the claim of the patent, the vertical members support chains and the same vertical members also support seats. As the Examiner has modified the claim, instead of the restricted expression "vertical members" he has made the expression all-inclusive by removing the word "vertical" so that, as changed, "members" includes anything else supporting the conveyor chains and anything supporting the seats instead of the same members supporting both the conveyor chains and the seats. In other words, Claim 7 of the patent is limited to vertical members with vertical conveyors and seats supported from such vertical members. The Examiner has changed Claim 7 so that it merely refers to a plurality of members, some of which can support the chains and others of which can support the seats.

Thus improperly changed and broadened the claim becomes an entirely different claim from that of the Holliday patent and fails to involve invention and therefore is unpatentable over the prior art as illustrated by the patents to Stark et al, 1,275,781 and Whitley, 2,518,965.

It is, therefore, believed that these facts should be taken into account in construing claim 7 of the Holliday patent and in a decision as to whether the limitations removed from this claim are immaterial when the Patent Office has previously rejected the same and the patentee has accepted such rejection.

It may be possible that a third party, namely, William E. Davis, is desirous of contesting an interference on this subject matter. Mr. Davis was employed by Long Manu-

facturing Company, the assignee herein, from November 14, 1949, through November 30, 1954, starting as Draftsman and being Chief Engineer from 1950 until termination of his employment. He was in charge of all engineering work and during this time he was furnished labor and material as well as being paid for his work, and he undertook to develop a tobacco harvester for the company.

It is believed that Mr. Davis has filed an application on the harvester which was developed during his employment at the Long Manufacturing Company, and the physical model of this harvester is in the possession of the Long Manufacturing Company. Although this harvester has conveyor chains and seats for the workmen, the conveyor chains do not have spring pressed clips but have projecting pins. If the claim is being originated by Davis, it would seem that Davis could not present such a claim on the invention as disclosed in that model, regardless of the question of patentability. It is therefore believed that any application of Davis is rightfully the property of the Long Manufacturing Company, the assignee herein, and since there can be no interference between two applications owned by the same assignee, applicant is prepared to submit an affidavit or substantiate his position in any way the Patent Office may require. The Davis invention is believed to be a different structure from that which either Holliday or applicant herein have claimed.

The Examiner has been requested to withdraw his suggestion of the claim for purposes of interference and the Commissioner is requested to exercise his supervisory authority and pass upon the holding of the Examiner and require him to withdraw his suggestion as unnecessary and unwarranted.

Respectfully,

.....

A. YATES DOWELL, *Attorney*

January 27, 1955

AYD/ak

EXCERPT FROM LONG PATENT FILE, p. 119

DEPARTMENT OF COMMERCE
UNITED STATES PATENT OFFICE

Washington

February 2, 1955

On Petition

In re application of: William R. Long; Serial No. 446,291; Filed July 28, 1954; For: Tobacco Harvester.

Decision of Assistant Commissioner, February 2, 1955

Applicant petitions that the Examiner be directed to withdraw his action suggesting, for the purposes of interference, a claim based on claim 7 of the patent to Holliday No. 2,672,248, and indicating that failure to make the proposed claim within a specified time will be considered a disclaimer of the subject matter involved. In his action of January 25, 1955 the Examiner indicates that all the claims of this application are considered allowable and patentably distinct from the claim suggested.

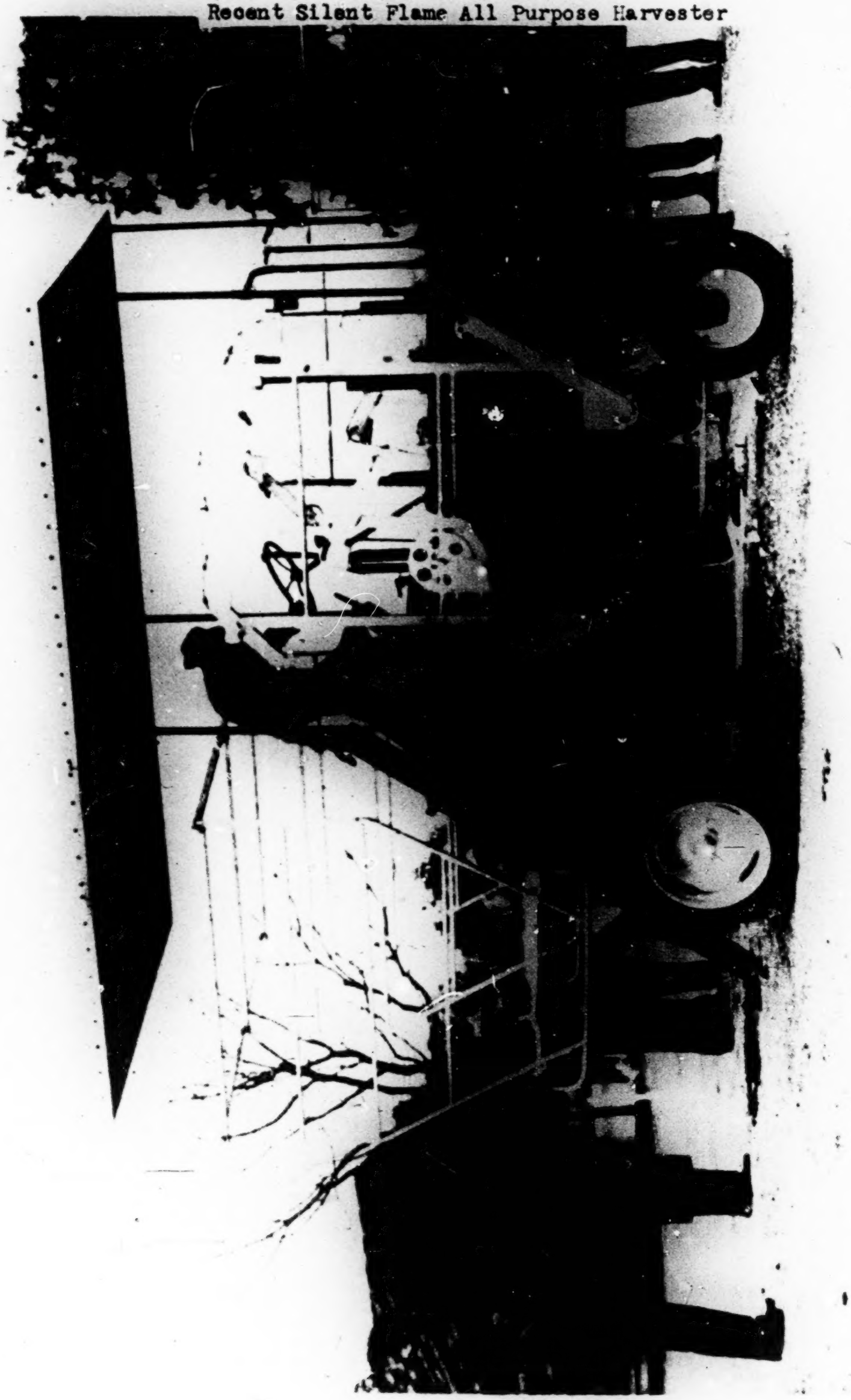
Rule 203(b) provides for the suggestion of claims when the claims of the parties to the proposed interference "differ in phraseology, but relate to substantially the same patentable subject matter". In the present case it is clear from the Examiner's action of January 25, 1955 that the claims of this application do not relate to the same patentable subject matter as the claims of the Holliday patent, or the modified claim suggested for the purpose of interference. Since the claims of this application will be allowable to the applicant regardless of any question of interference with the patent, it is not considered that the suggestion of the proposed claim can serve any useful purpose.

The petition is accordingly granted and the application is returned to the Primary Examiner with instructions to withdraw the suggestion of the proposed claim and to take such further action as the condition of the application requires.

Assistant Commissioner
ARTHUR W. CROCKER

A. YATES DOWELL
1158 Munsey Building
Washington 4, D. C.

HOLLIDAY EXHIBIT 14
Recent Silent Flame All Purpose Harvester



H. O. ADAM.

DEVICE FOR TRANSPORTING LOADS.

APPLICATION FILED JAN. 6, 1910.

982,654. Patented Jan. 24, 1911.

3 SHEETS—SHEET 1.

Fig. 1

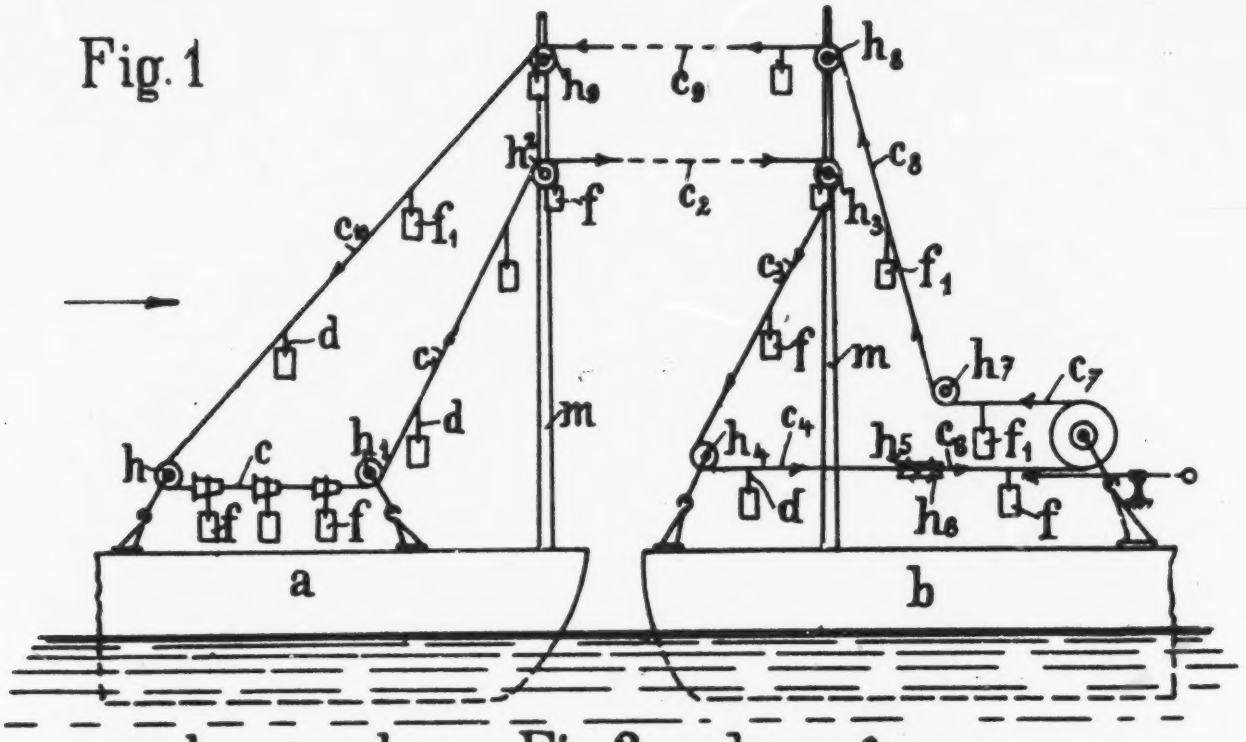


Fig. 2

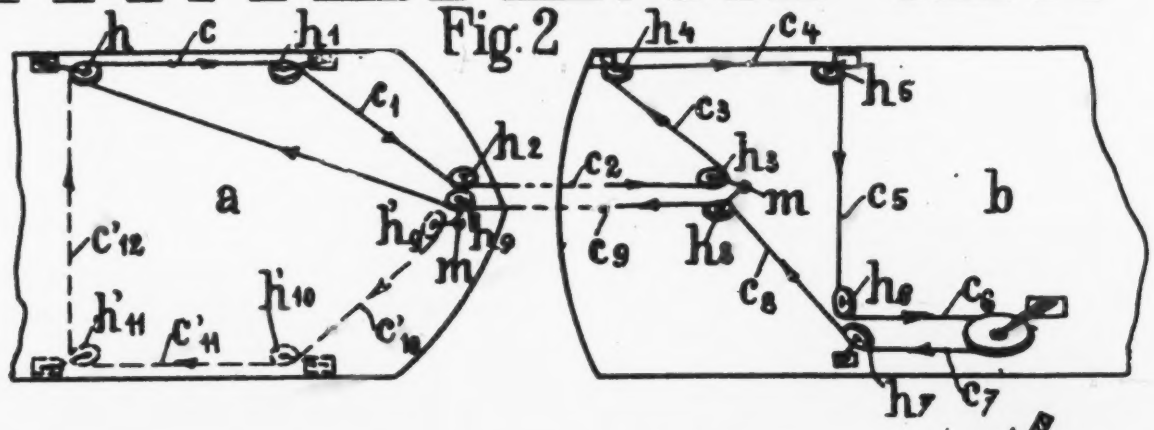


Fig. 4

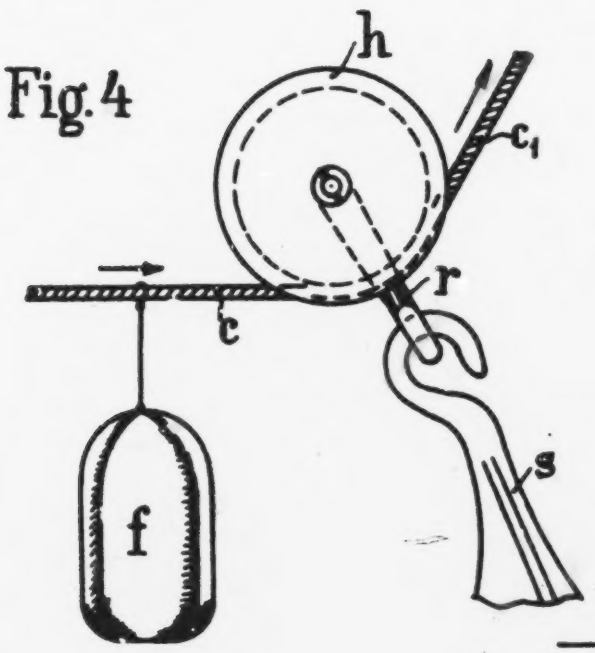
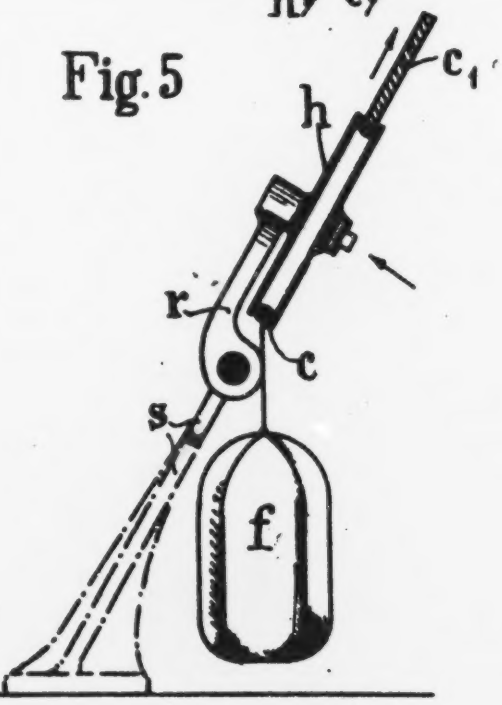


Fig. 5



Witnesses:
H. R. Schulz
Arthur E. Zimmer.

Inventor
Heinrich Otto Adam
by his attorney
Dawson & Bucan

H. O. ADAM.

DEVICE FOR TRANSPORTING LOADS.

APPLICATION FILED JAN. 6, 1910.

982,654. Patented Jan. 24, 1911.

3 SHEETS—SHEET 2.

Fig.3.

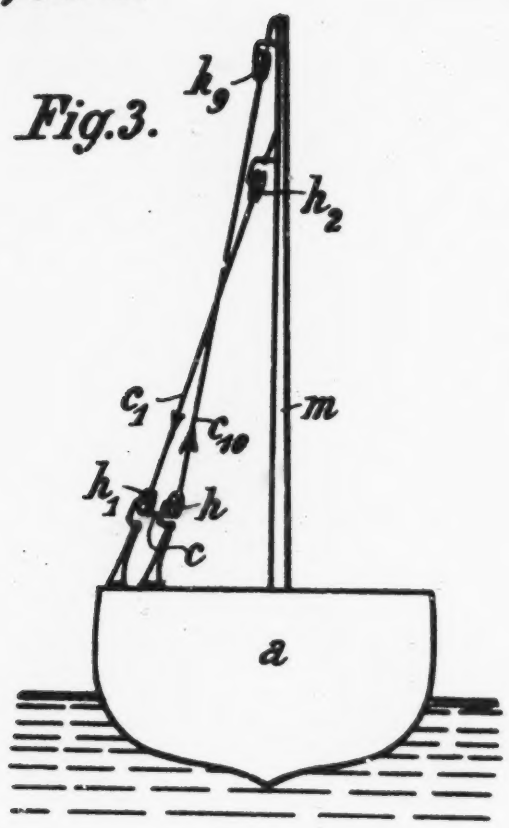


Fig.6.

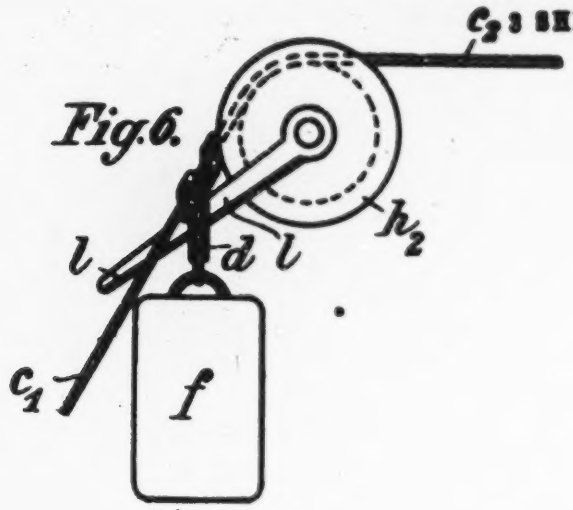


Fig.8.

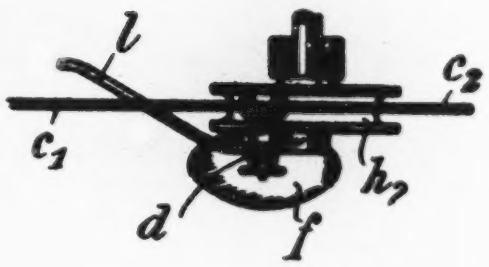


Fig.9.

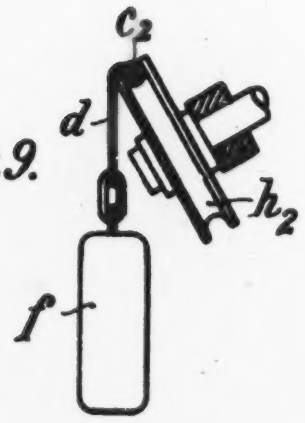


Fig.7.

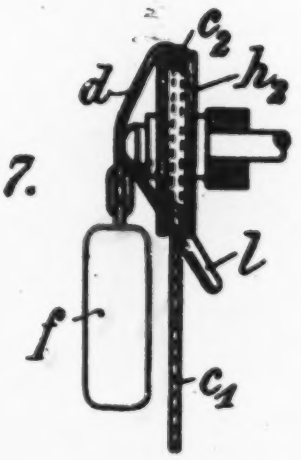


Fig.10.

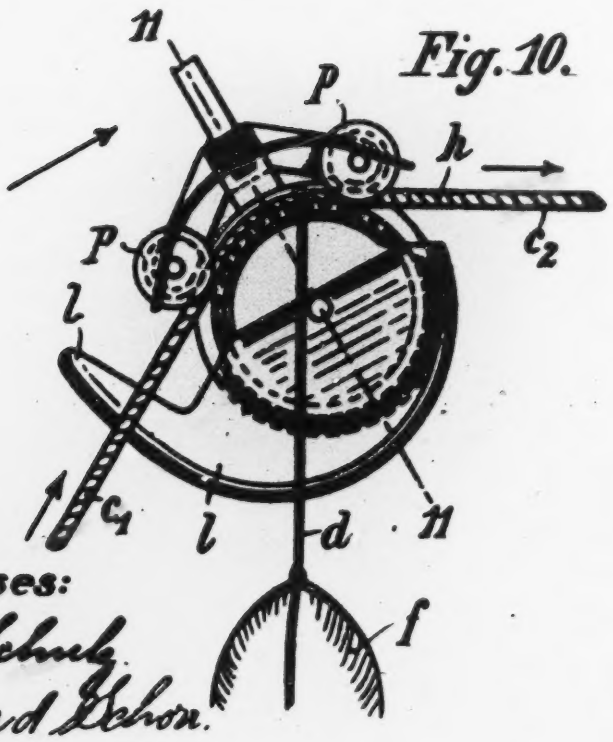
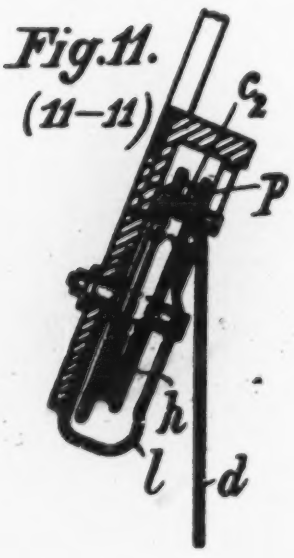


Fig.11.



Witnesses:

H. B. Schuck.

Edward Ekhon.

Inventor.

Heinrich Otto Adam

by

Attorney.

H. O. ADAM.

DEVICE FOR TRANSPORTING LOADS.

APPLICATION FILED JAN. 6, 1910.

982,654.

Patented Jan. 24, 1911.

3 SHEETS—SHEET 3.

Fig. 12.

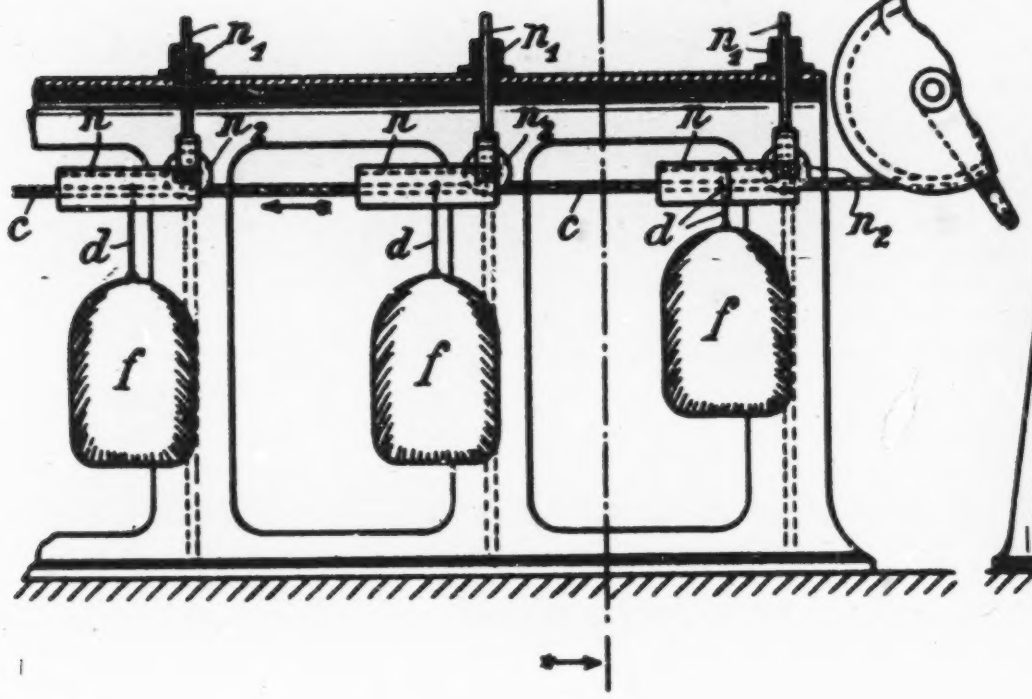


Fig. 13.

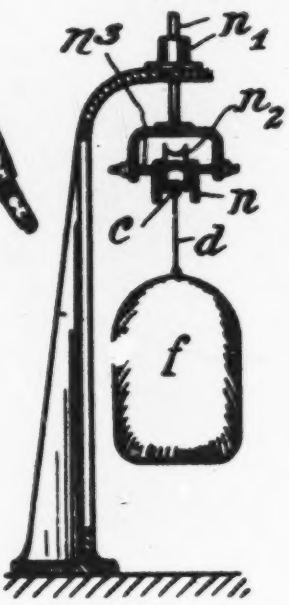


Fig. 14.

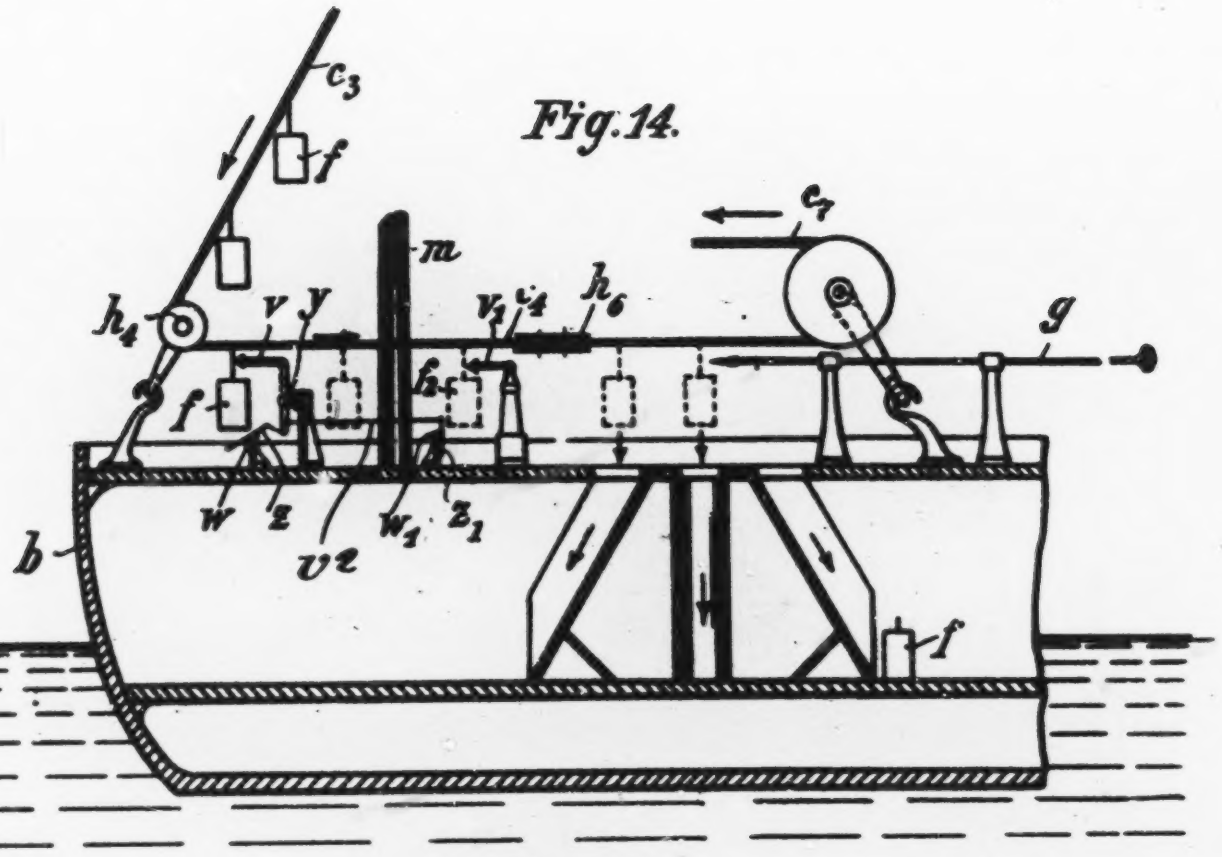
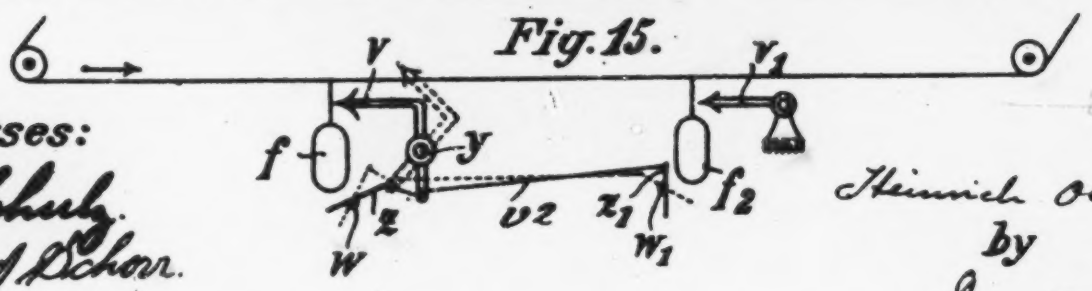


Fig. 15.



Witnesses:

W. A. Schulz.

Edward Schorr.

Inventor:

Heinrich Otto Adam.

by

Attorney.

UNITED STATES PATENT OFFICE.

HEINRICH OTTO ADAM, OF DRESDEN, GERMANY.

DEVICE FOR TRANSPORTING LOADS.

982,654. Specification of Letters Patent. Patented Jan. 24, 1911.

Application filed January 6, 1910. Serial No. 536,690.

To all whom it may concern:

Be it known that I, HEINRICH OTTO ADAM, a citizen of the German Empire, residing at 37 Uhlandstrasse, Dresden, in the German Empire, have invented certain new and useful Improvements in Devices for Transporting Loads, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to an improvement in the apparatus for conveying loads especially suitable for use in coaling ships, described in my prior specification of Letters Patent of the United States No. 840,099. In the apparatus therein described there are employed, for the purpose of attaching the loads to the haulage-rope flexible supporting links, such for instance as slings, which are destroyed when the load arrives at its destination. In arrangements of this kind the conveyance of the loads takes place between a pair of pulleys.

With the present invention the rope carrying the slings may travel over or underneath any suitable number of pulleys without causing an undue twisting of the rope and without interfering with the loads depending from the slings. For this purpose, the pulleys are so pivoted to their supporting brackets that they adjust themselves automatically to the direction of the pull exercised by the rope, while suitable sling deflecting devices prevent any undue interference between the pulleys and the loads carried by the slings.

In the accompanying drawings: Figure 1 shows diagrammatically in elevation the arrangement of the pulleys for guiding the ropes when coal is to be conveyed from a transport ship to a man-of-war. Fig. 2 is a plan view of the arrangement shown in Fig. 1, and Fig. 3 is a transverse view of the same. Fig. 4 is a side view showing the method of suspending a rope pulley to oscillate; Fig. 5 is a front view of the same; Fig. 6 shows a device for deflecting the load when the sling carrying it passes over a pulley and Figs. 7 and 8 are respectively a side view and a plan of the deflecting device. Fig. 9 shows a modified form of carrying the invention into practice wherein a separate deflecting device is dispensed with; Fig. 10 shows a special form of deflecting device having in side elevation a horn-shaped projection; Fig. 11 is a front view of this arrangement showing at the same time the slight projection of the edge of the pulley. Figs. 12 and 13 show respectively in side and in front view a place at which the pulley mechanism is loaded; Fig. 14 shows diagrammatically the arrangement for taking off the loads by means of which unloading may be effected at various places; and Fig. 15 shows an arrangement of devices for destroying the slings at the points desired.

The drawings by no means exhaust the possibilities of this invention, which may be modified in any suitable manner without departing from the fundamental principle thereof.

In Fig. 1, a indicates the transport and b the man-of-war. Both ships are provided with masts or other suspension devices which carry the pulleys h_2, h_3, h_5 and h_6, other pulleys h, h_1, h_4, h_7 and h_8 being arranged in suitable positions, for instance on deck or in the hold. Over these pulleys there runs a haulage rope c, c_1, c_2 etc.; the loads to be conveyed from the transport a to the man-of-war b are indicated by f while f_1 indicates the receptacles to be returned from b to a. The loads f and f_1 are attached to the rope mechanism by means of flexible carriers d, such for instance, as slings and the like.

Now the novelty of the present invention consists in the fact that the rope may be guided at an angle not only in a single plane, but in any number of planes inclined to each other, without the pulleys interfering with the loads and without the slings or the loads carried thereon being caused to wind themselves around the ropes in consequence of their rotation. To obtain this result, the pulleys, as is shown by way of example in Figs. 4 and 5, are suspended to oscillate in such manner that the groove for the rope may lie at any time in a plane determined by two portions of the rope, as for instance, by the portions c and c_1.

In Fig. 4, h is the pulley which is attached by means of the shackle r to the hook s. The shackle r may assume any position whatever in relation to the hook s with the result that the pulley h can also assume any position in relation to s the position of this pulley at any moment being determined by the position of the portions c and c_1 of the rope. This arrangement results in entirely eliminating all possibility of lateral friction between the rope and the edges of the pulley-groove together with the consequent rotation of the ropes during the working of the

apparatus. As now the rope can be guided in any desired manner it can of course also be led for some distance horizontally over the deck and several loading devices can then be arranged on it adjacent to each other. For this purpose there are arranged behind each other a number of sleeves *n* of the kind described in my aforesaid prior specification for the purpose of conveying the slings on to the rope. With the constructions hitherto employed, these sleeves were made removable with the object of facilitating the passage of the slings of the sleeves behind them. Such contrivances are however not only very complicated and likely to cause great waste of time, but they are also very dangerous as the remains of the slings that have been cut away and which are moving along with the rope-circuit, often cause the destruction of the body of the sling.

Now in accordance with the present invention the arrangement of several sleeves is rendered practicable by so constructing them that they do not entirely surround the rope but only partially embrace it either from above or from the side to which effect the sleeves are of semi-tubular shape open at the bottom. Such sleeves as shown in Figs. 12 and 13 are preferably movably suspended in such manner that the rope and the parts carrying the loads can always pass them freely.

In Figs 12 and 13, *n* indicates the separate sleeves, *d* are the slings and *f* the sacks of coal. The sleeves *n* are preferably guided by guides n_1 and may bear by means of pulleys n_2 on the rope *c*. The pulleys n_2, by being slidably mounted on spindles n_3, are capable of lateral movement if the rope should strike against them. Should it happen, in the constructions heretofore usual, that the slings should wind themselves around the rope, sleeves as heretofore constructed would on account of the apertures therein carry away the slings and the loads suspended thereon. But the present invention renders the rotation of the rope unobjectionable and therefore obviates this risk. The loading is effected by the flexible slings *d* being placed upon several of the sleeves *n* and then attached to the loads to be carried. After the loads have been secured in position the slings *d* are pushed away from the sleeves and are carried along by the rope-circuit. The loads now, as shown in Fig. 1, are brought beneath the pulley h_1 of the transport *a* and moved up to the level of the pulley h_2. The guidance of the slings, that is to say, of the loads carried thereon over the pulleys h_2 and h_3 involves very considerable difficulty. Such a pulley over which the sling carrying the load is to be guided, is therefore furnished with a deflecting device, the end of which, as shown in Figs. 6 to 8, projects beneath the conveying rope. When the sling *d* with the load *f* comes close to the deflecting device, both the sling and the load carried along by the rope *c* will be turned sidewise and during the further rotation of the pulley will run in the groove thereof over the pulley in the manner shown by way of example in Figs. 7 and 8. As soon as the sling has passed over the pulley the load *f* will again resume its vertical position. The lateral deflection of the load may however also be effected in such manner as to dispense with the deflecting device *l*, the pulley being caused to assume an oblique position as shown in Fig. 9 so that the load is suspended vertically upon the sling *d* beyond the rim of the pulley and is kept by its weight out of contact with the pulley. But even when this arrangement is adopted it is advisable also to provide a deflecting device.

Figs. 10 and 11 illustrate a modified construction of deflecting device. In this case the lever arm *l* is bent upward so as to form a horn and projects upwardly from beneath the rope. This arrangement has the great advantage that no matter how high the speed may be, the load cannot come in collision with the pulley. Fig. 11 illustrates moreover a further modification of the method of guiding the pulleys, according to which the pulley on the side on which the sling is suspended, has either no rim whatever or only a very low rim, an arrangement which affords great protection to the sling. To prevent the springing out of the rope from the groove of the pulley *h* there are provided guide pulleys *p* which are preferably connected with the pulley *h* by means of a frame mounted to oscillate after the manner shown in Figs. 4 and 5, with the result that the rope pulley *h* together with the guide-pulleys *p* can assume any position suitable to the directions of the parts c_1 and c_2 of the rope *c*. By this means it is rendered possible to convey the loads suspended from the rope *c* over the pulleys without incurring the risk that the slings with the loads thereto attached will be drawn into the pulleys or become heaped up in front of them.

Just as the possibility of guiding the ropes in any desired manner enables loads to be taken up at various places so in like manner it enables them to be put down at different points, their accumulation at any one point of the man-of-war being thus prevented. To this end there is arranged either beneath, or adjacent to, the hauling rope any suitable device for destroying the slings. This destroying device may be adjusted along the length of the rope-circuit *c*, being for instance movable in guides. Instead of employing one such device, which in that case must be movable, a number of

such devices may be provided, these being put alternately into and out of action with the result that the loads are released at one time at the first, and at other times at the second or third positions, to be conveyed away by suitable chutes. Such an arrangement is shown in Fig. 15. After the load *f* has been separated from the sling by the destroying device *v* it will fall upon the plate *z* pivoted at *w* by which means the device *v* is caused to rotate about the point *y* with the result that the subsequent loads may pass by it and reach *v'* where they are released. The load f_2 now falls upon the pivoted plate *z'* which as it rotates about its pivot *w'* causes by connecting rod v_2 the device *v* again to assume its initial position. By this means the destroying devices *v* and v_1 are employed alternately. Figs. 14 and 15 illustrate the knives *v* and *v'* diagrammatically and at right angles to the position which they actually occupy. In other words, the knives are made to swing in a horizontal plane on the vertical pivot *y* so that by tilting them laterally, the knives will be swung into or out of the path of slings *d*. For the purpose of destroying the slings use may also be made of the variation of the direction of the hauling rope on a pulley or of the surface pressure in a groove. By varying the speed of the rope it is for instance possible so to increase the accelerating forces as to destroy either all the slings carried by the rope or a portion thereof. It is consequently also possible to effect the division of the loads when arriving on the man-of-war by adjusting for instance the speed of the rope in such manner as to enable a number of the slings to withstand the strain due to the accelerating forces, while another portion is destroyed. It is also possible to effect the division of the loads at the unloading places by making individual slings either stronger or weaker than the remainder so that at the weak spots described only the weak slings are destroyed, while the stronger ones are carried to the special destroying devices.

What I claim is:

1. A device of the character described, comprising a series of pulleys, means for so securing said pulleys to a ship that they are capable of universal movement, an endless rope engaging the pulleys, load-carrying slings suspended from the rope, means for deflecting said slings from the pulleys and semi-tubular loading sleeves straddling the rope.

2. A device of the character described, comprising a series of pulleys, means for so securing said pulleys to a ship that they are capable of universal movement, an endless rope engaging the pulleys, load-carrying slings suspended from the rope, means for deflecting said slings from the pulleys, semi-tubular loading sleeves straddling the rope and wheels slidably journaled to said sleeves and adapted to engage said rope.

3. A device of the character described, comprising a series of pulleys, means for so securing said pulleys to a ship that they are capable of universal movement, an endless rope engaging the pulleys, load-carrying slings suspended from the rope, means for deflecting said slings from the pulleys and means for successively removing the slings from the rope at alternate points.

4. A device of the character described, comprising a rope, slings suspended therefrom, a pair of consecutive cutters arranged in proximity to the slings, and means for so connecting the cutters, that when one cutter is operative, the other cutter is inoperative.

5. A device of the character described, comprising a series of pulleys, means for so securing said pulleys to a ship that they are capable of universal movement, an endless rope engaging the pulleys, flexible load carriers suspended from the rope, and an open-bottomed loading device arranged in proximity to the rope and forming a clearance for the flexible carriers.

6. A device of the character described, comprising a series of pulleys, means for so securing said pulleys to a ship that they are capable of universal movement, an endless untwisted rope engaging the pulleys, flexible carriers depending from the rope, and means for deflecting said carriers when passing a pulley, said means consisting of arms, which project upwardly from beneath the rope.

In testimony whereof I affix my signature in the presence of two witnesses.

HEINRICH OTTO ADAM.

Witnesses:
PAUL ARRAS,
CLÄRE SIMON.

Dec. 30, 1930. L. B. NEIGHBOUR ET AL 1,787,161

METHOD OF AND APPARATUS FOR HANDLING BEETS

Filed June 29, 1923 6 Sheets-Sheet 1

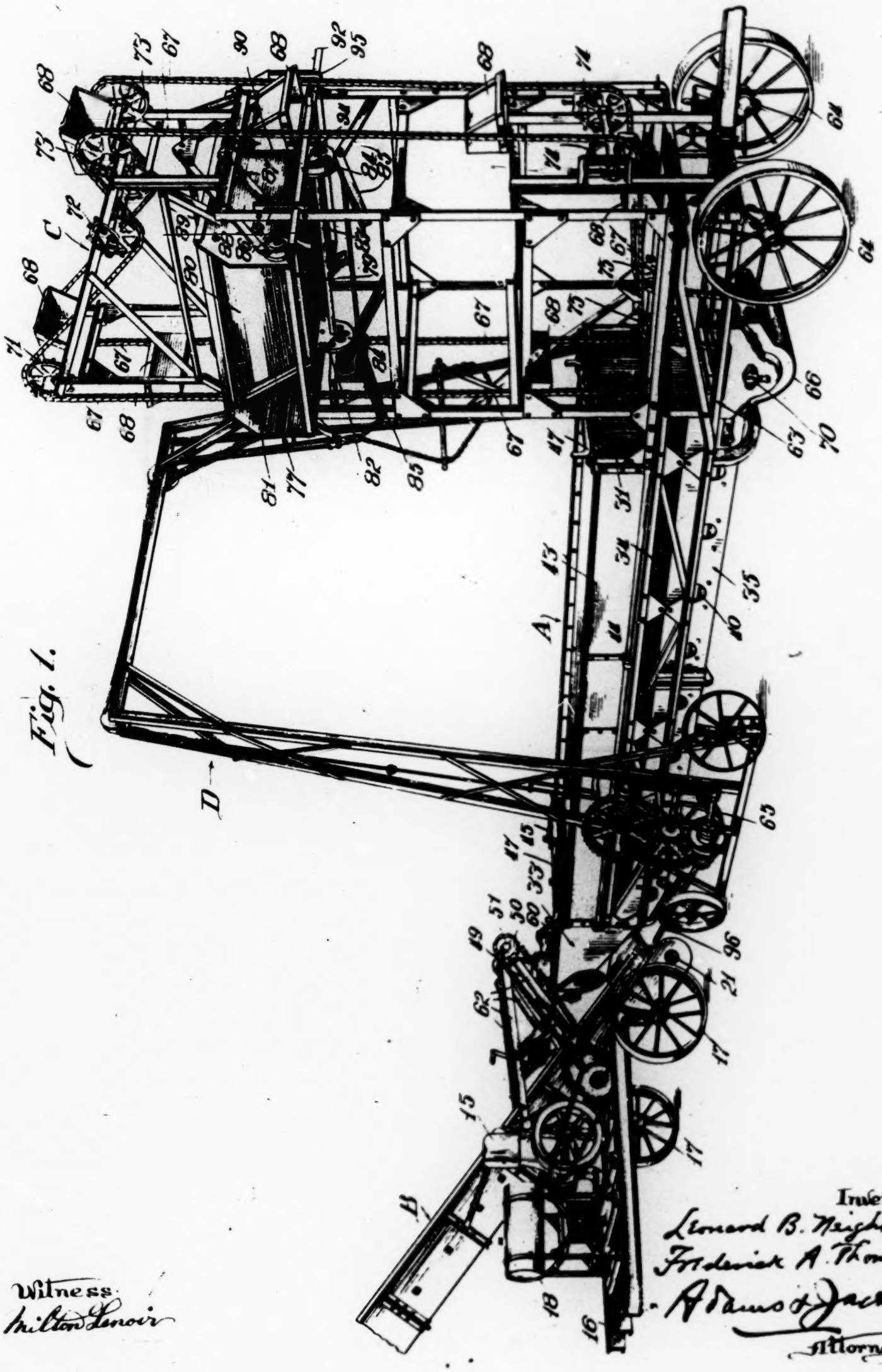


Fig. 1.

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METHOD OF AND APPARATUS FOR HANDLING BEETS

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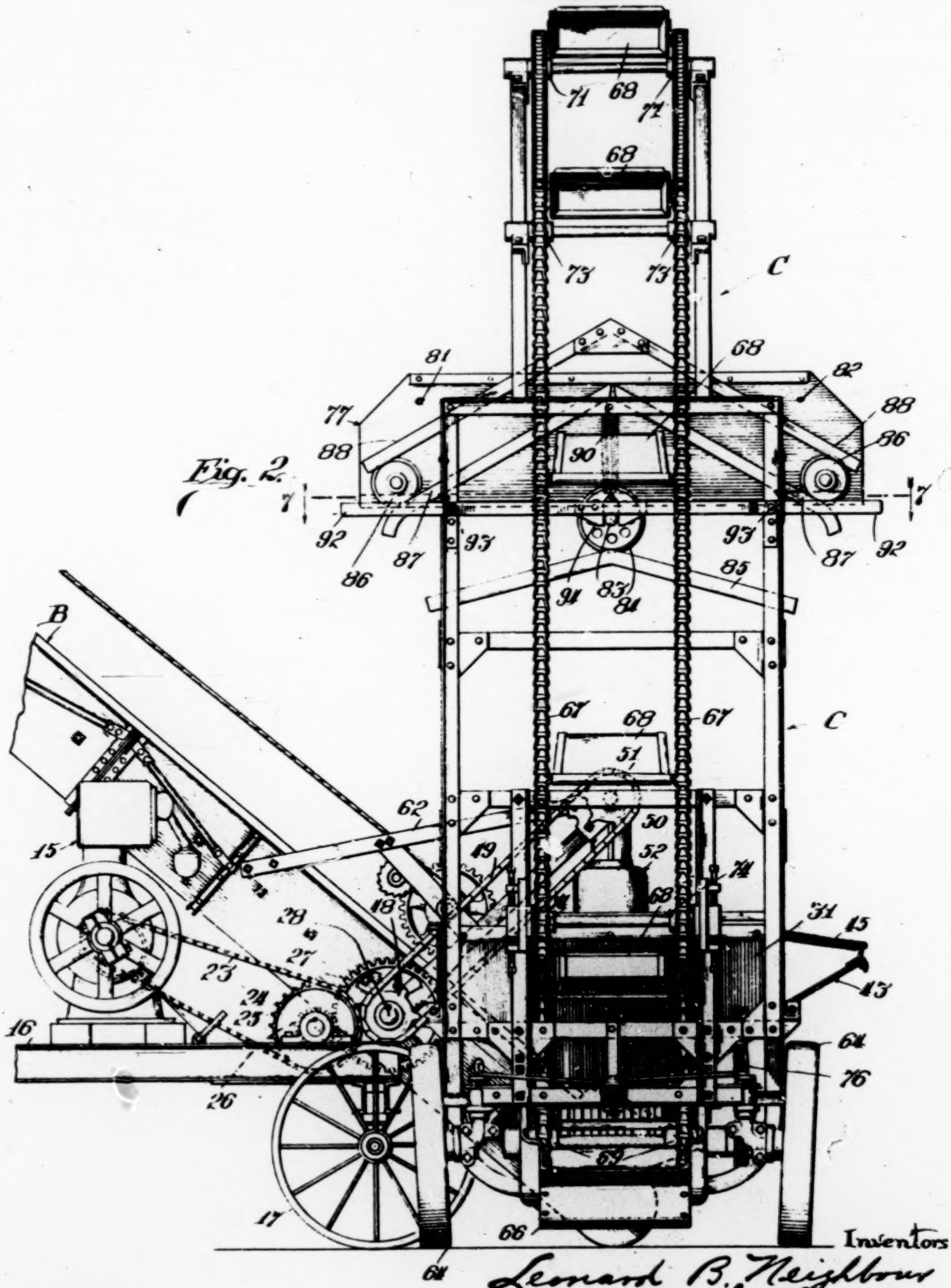
Fig. 2.



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METHOD OF AND APPARATUS FOR HANDLING BEETS

Filed June 29, 1923 6 Sheets-Sheet 3

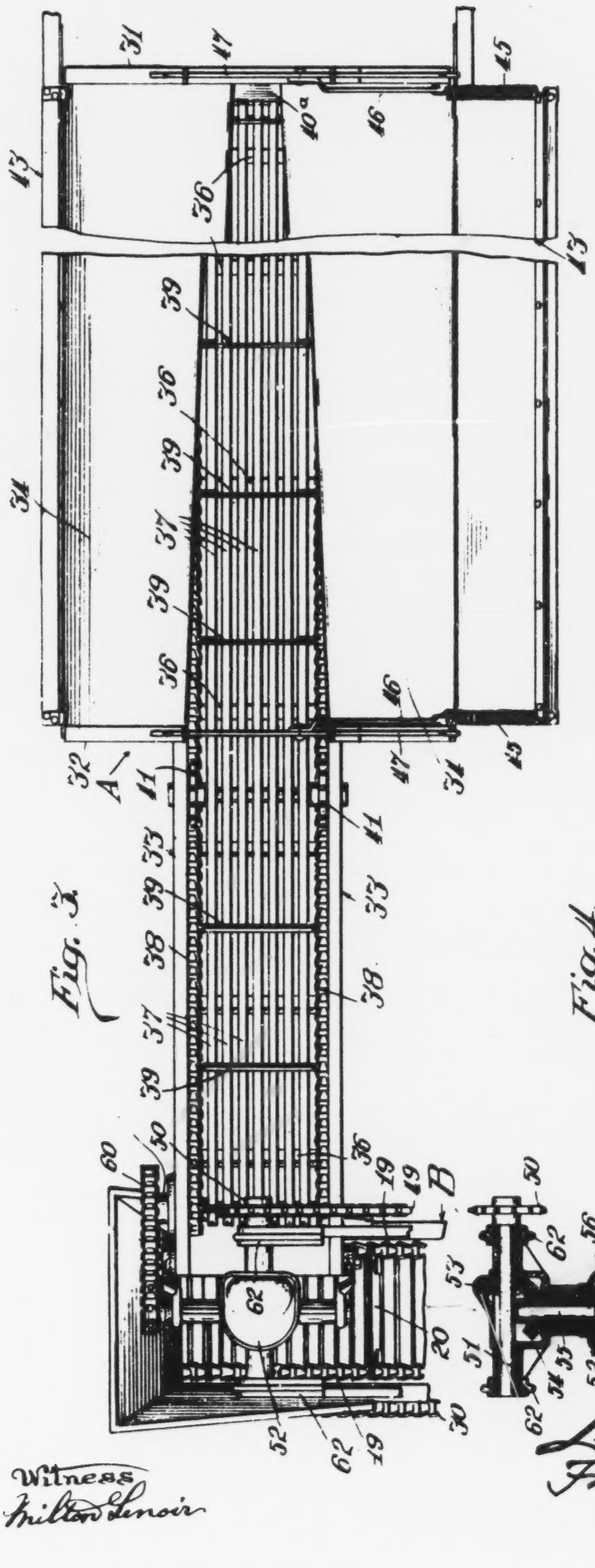

Fig. 3.

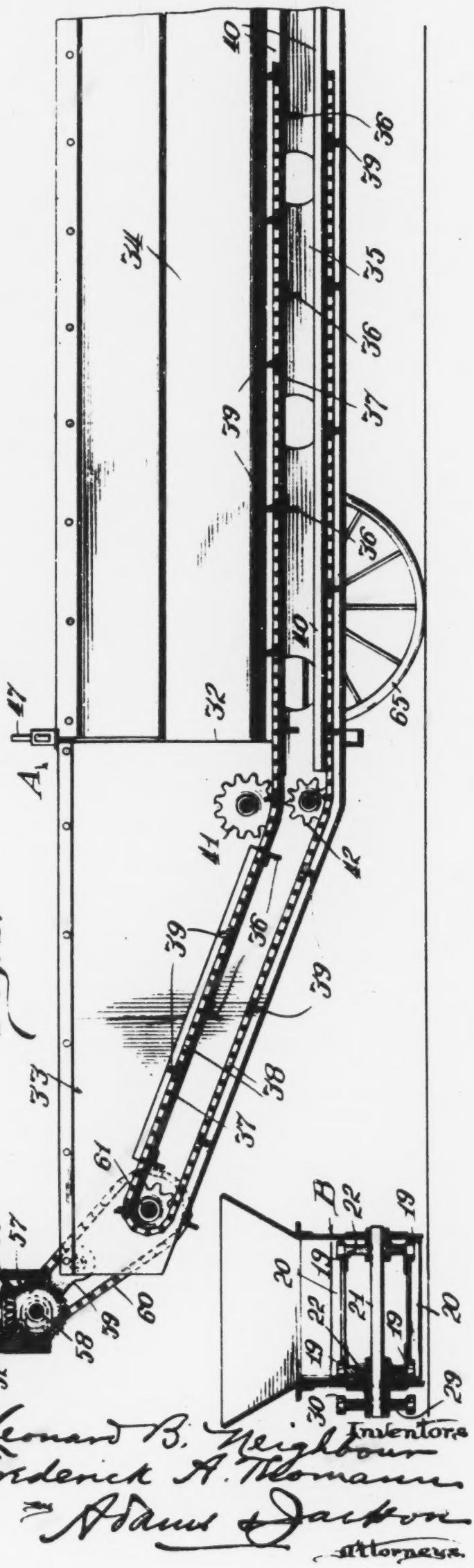

Fig. 4.

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METHOD OF AND APPARATUS FOR HANDLING BEETS

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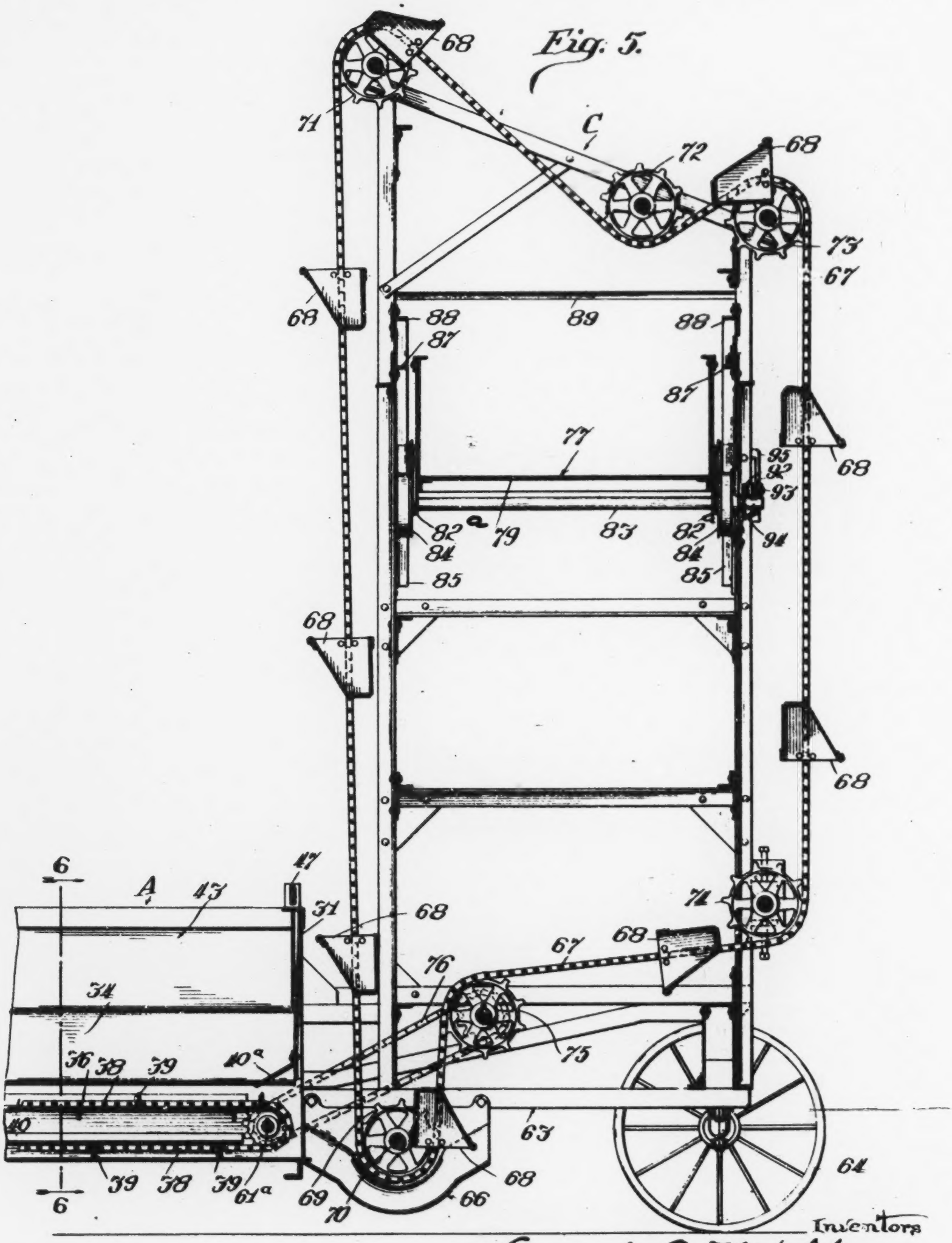
Fig. 5.



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METHOD OF AND APPARATUS FOR HANDLING BEETS

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Fig. 6.

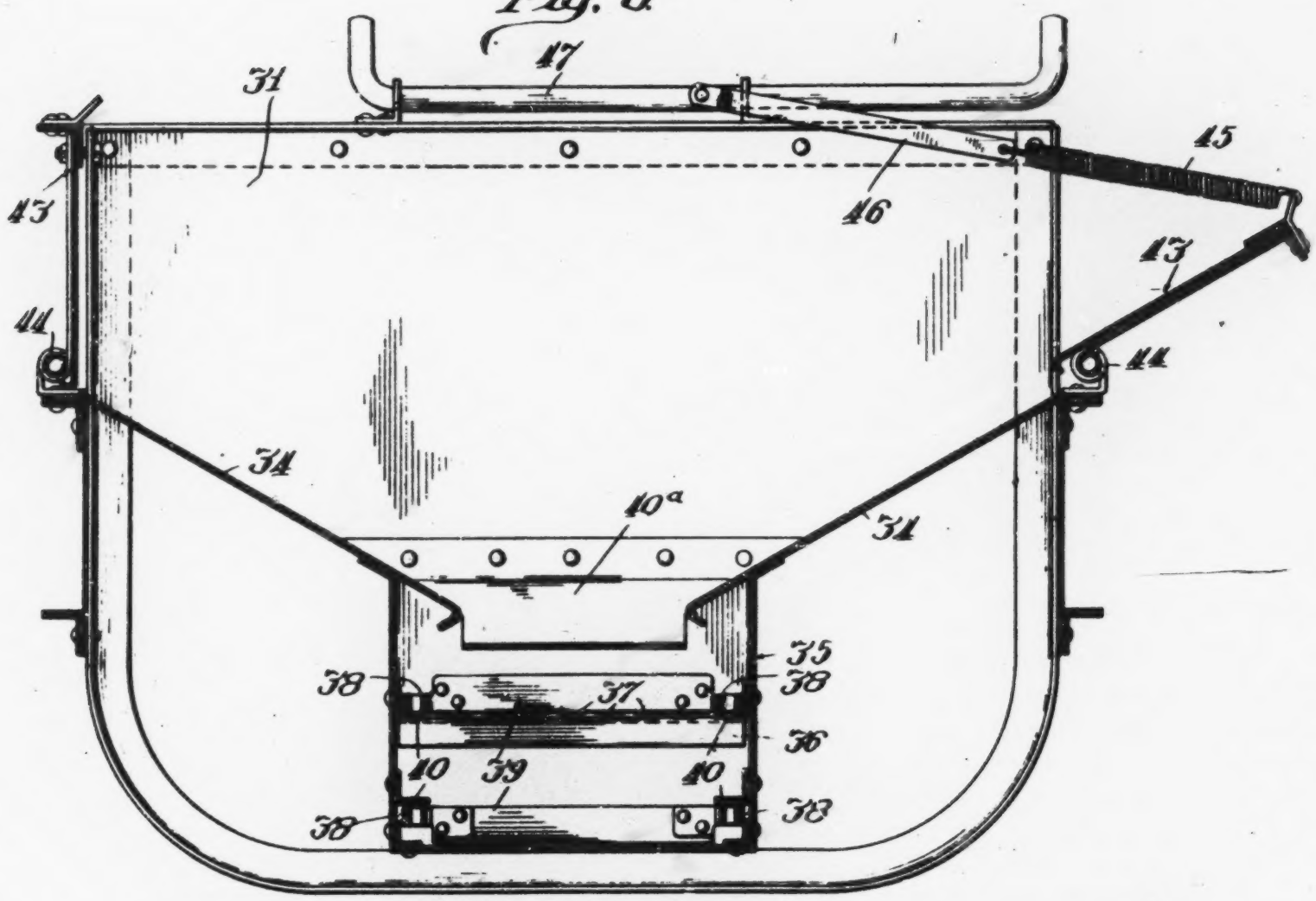


Fig. 7.

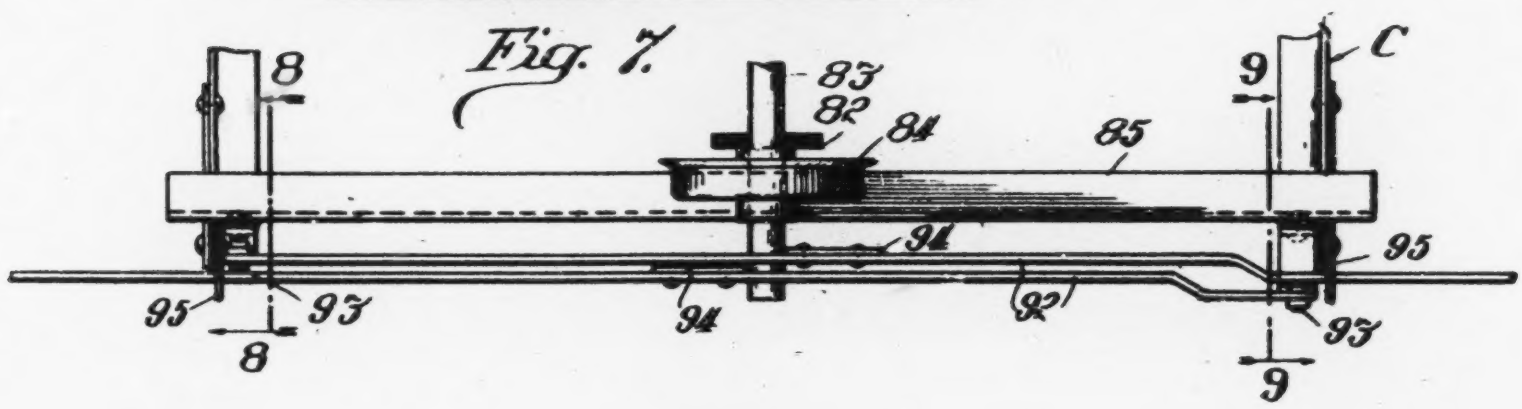
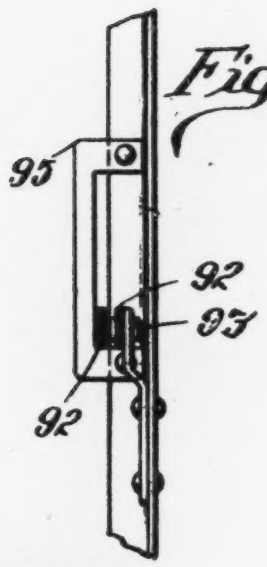
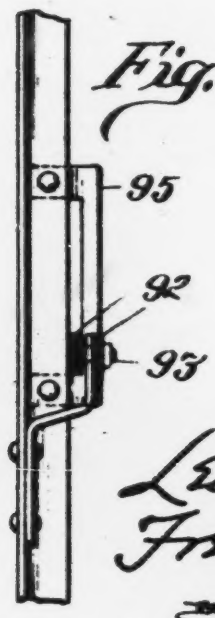


Fig. 8.



Witness
Milton Lenoir

Fig. 9.



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METHOD OF AND APPARATUS FOR HANDLING BEETS

Filed June 29, 1923 6 Sheets-Sheet. 6

Fig. 10.

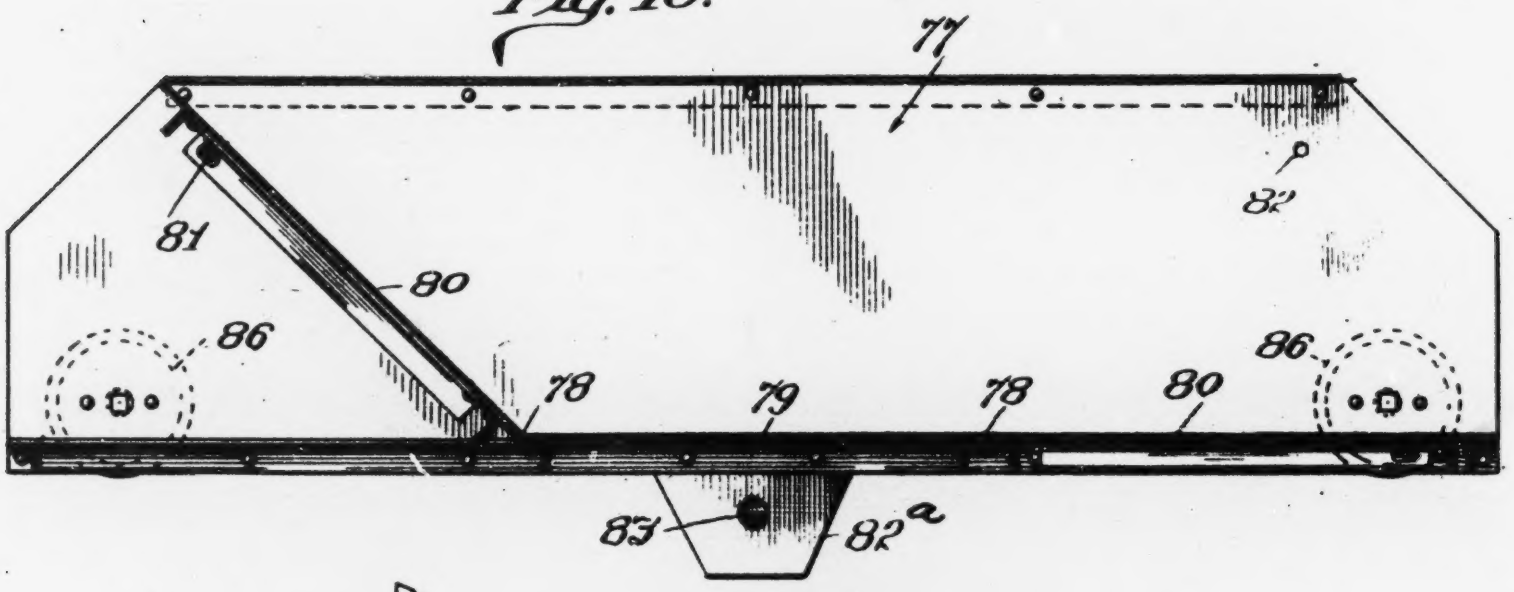
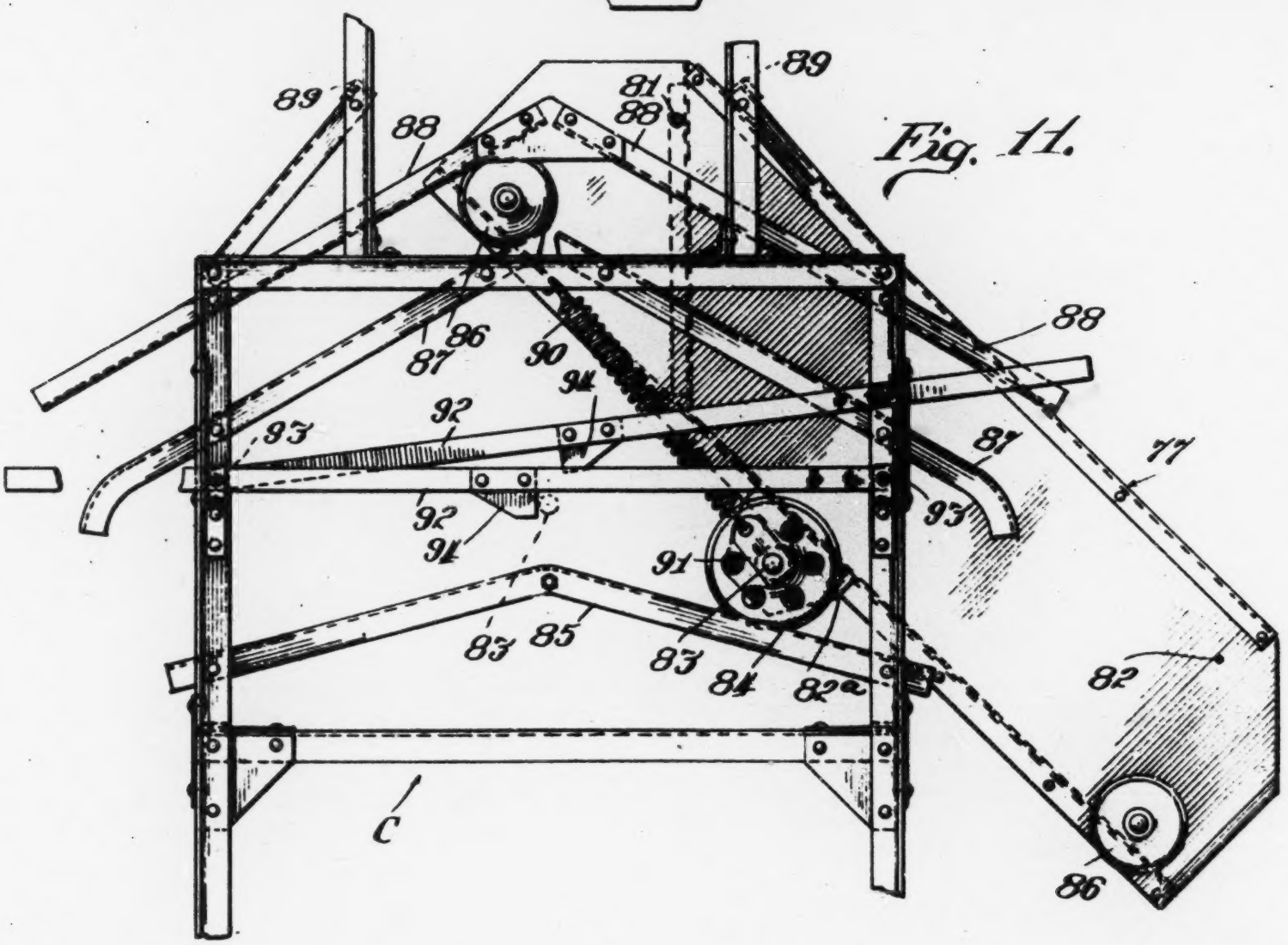


Fig. 11.



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Patented Dec. 30, 1930 1,787,161

UNITED STATES PATENT OFFICE

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METHOD OF AND APPARATUS FOR HANDLING BEETS

Application filed June 20, 1928. Serial No. 286,445.

After sugar beets are harvested they are generally transported by wagons to a point adjacent to a railroad where they are either loaded directly into cars or are arranged in large piles for storage until cars are available. Such beets are sold by weight and as they usually have attached to them a considerable amount of soil it is desirable that before such beets are placed in the railway cars or piled up awaiting shipment such soil be separated from them to as great an extent as possible. It is the leading object of our invention to provide an improved method and apparatus for effecting such a separation immediately following the dumping of a load of beets from a wagon, and causing the soil that is so separated from the beets to be accumulated in a receptacle from which it can be returned to the wagon,—the advantage of such operation being two-fold, viz, it permits the net weight of the load of beets to be ascertained by deducting the weight of the wagon and the soil that has been returned to it from the ascertained weight of the wagon with both beets and soil in it, and it also ensures that the full weight of soil so separated from the beets may be promptly deposited in the then empty wagon for return, if desired, to the field where the beets were harvested. We attain this object in the manner hereinafter described, the mechanism shown being one that has been found very effective in practicing our improved method.

In the drawings,—

Fig. 1 is a perspective view of an apparatus embodying our invention (a portion of one of the members thereof being partly broken away) and adapted to permit a practicing of our novel method;

Fig. 2 is an end elevation as viewed from the right-hand side of Fig. 1;

Fig. 3 is a plan view, partly broken away, of the receiving hopper that constitutes the intermediate one of the three principal members of the apparatus, the view also showing the conveyor element that is supported therein and the driving connections between said conveyor and the lower portions of an inclined beet elevator located at one end of said hopper;

Fig. 4 is a longitudinal section taken substantially centrally through the parts shown in Fig. 3;

Fig. 5 is a substantially central longitudinal section of the right-hand portion (as viewed in Fig. 1) of the apparatus, and illustrating an end part of the hopper that appears in Fig. 4 and also showing the soil elevating, retaining and dumping means;

Fig. 6 is an enlarged cross-section through the hopper, the section being taken at line 6—6 of Fig. 5;

Fig. 7 is a view partly in plan and partly in horizontal section at the line 7—7 of Fig. 2, the view illustrating the arrangement of the pivoted levers by which the soil receiving and dumping member is held locked in place;

Figs. 8 and 9 are views taken, respectively, on the section lines 8—8 and 9—9 of Fig. 7;

Fig. 10 is a detail being an enlarged sectional view of the soil receiving and dumping member; and

Fig. 11 is a side elevation in dumping position of the receiving and dumping member that is shown in Fig. 10, a portion of the tower-like framework that supports such member being also shown.

When a wagon load of beets is dumped there is some loosening of the dirt adhering to the beet bodies, due to their movement while sliding and falling upon the ground or into the receptacle placed to receive them, but the greater part of the dirt is not loosened by the dumping operation, and the removal of the dirt that continues to adhere to the beet bodies is a problem which prior to our invention has not been satisfactorily solved. Our improved method, however, efficiently accomplishes this purpose, and it consists in depositing the beets in mass in a suitable receptacle, such as a hopper, having a perforated false bottom adapted to support the beets while permitting the loosened dirt to sift through it, and inducing a commotion in the mass by moving the beets constituting the lowermost portion thereof along under and relatively to the superimposed mass, so that the consequent agitation and the attrition of the beets one upon another loosens the dirt adhering to the beet bodies and per-

mits it to sift through the mass and through the false bottom. As a further step in the process, the beets in the lower part of the mass are moved along out of the receptacle so that the mass is gradually depleted from below, and the process continues until the mass is reduced to a single layer of clean beets which passes out of the receptacle in due course. This process is practiced with the beets and dirt in a dry state, so that the dirt when loosened sifts through the mass and passes down to the bottom of the receptacle, from which it is removed separately from the beets and when weighed its weight accurately represents the tare. If water were used, obviously these results could not be obtained. While this method of operation is particularly advantageous for use in connection with sugar beets, we wish it to be understood that it may also be applied to the treatment of other articles under analogous conditions, and therefore our invention is not limited to its application to beets alone.

In practicing our improved method we prefer to do so by the use of an apparatus such as that illustrated in the accompanying drawings and as hereinafter described, but our invention may be practiced by the use of other forms of apparatus.

Referring to the several figures of the drawings,—A, B and C indicate the three principal elements of the apparatus employed in the handling of beets and the soil that is dislodged therefrom after such beets and soil have been dumped from wagons, or otherwise, into the central or hopper member A of the mechanism. Each of the three principal members referred to comprises an endless conveyor which conveyors are adapted to be simultaneously and continuously driven from a suitable source of power which, as here shown, is an ordinary gasoline engine 15 that is mounted upon and preferably adjacent to one side of a frame 16 provided with wheels, two of which are shown in Figs. 1 and 2 and indicated by 17. Adjacent to the engine 15 there is shown a gasoline supply tank 18. The endless conveyor for the elevator B may be of any suitable character adapted when beets are transferred to it to properly hold the same and carry them upward to the point of discharge. A small portion of such conveyor is shown in Fig. 3 where the two chain members thereof are indicated by 19 and one of the cross-strips that connects such chains and acts to engage the beets is indicated by 20. In the lower portion or boot of this conveyer will be located a shaft 21, as shown in Fig. 4, having sprocket wheels 22 secured thereon, and it will be understood that in the upper end portion of the elevator there will be a similar shaft and other sprocket wheels over which latter the chains pass. We have not deemed it necessary to show more than the lower portion of the elevator, as, generally speaking, the construction and operation of such a device are well understood. However, the elevator that we prefer to employ is of the construction shown in Letters Patent, No. 1,473,795, dated November 13, 1923, granted upon the application of the applicant, Neighbour, which elevator is one that may be turned to stand in an inclined position as represented in the drawings, or when not desired for use may be turned to lie in a substantially horizontal position upon its supporting frame 6—all as described in said Letters Patent. The conveyor in the elevator B is driven from the engine through a chain 23 that passes over a sprocket on the shaft of the engine 15 and over a sprocket 24 that is fast on a shaft 25 that also has secured to it, as indicated by dotted lines in Fig. 2, a pinion 26 that meshes with a gear 27 fast on a shaft 28, and with which latter shaft there is connected a sprocket (not shown) located at the opposite side of the elevator from that seen in Fig. 2, and over this latter sprocket and a sprocket 29 that is shown in Fig. 4 runs a chain 30.

Turning, now to the central principal member A of the mechanism, it is seen by reference to the drawings to consist of a horizontally elongated receptacle in the form of a long, wide open topped body closed at that end that is farthest removed from the elevator B by a vertical wall 31, (see Figs. 1 and 6). Projecting centrally from the opposite end wall 32 is an open topped extension 33, the bottom of which inclines upwardly towards its outer end, which outer end, as clearly shown in Figs. 3 and 4, overlies the boot or lower end of the elevator B. The main or wider portion of this receptacle or hopper has inwardly and downwardly inclined bottom pieces 34 adapted to direct the beets that are dumped into the hopper into a long rectangular shaped trough 35 that extends centrally of and forms the lower part of the hopper and corresponds in width and registers with the extension piece 33. The upper marginal portions of this trough are turned and lie against and are secured to the inclined bottoms 34 whose inner edge portions project beyond the vertical walls of the trough, as clearly shown in Fig. 6. As best shown in Fig. 3, these inner marginal portions of the downwardly inclined members 34 diverge from the end wall 31, so that the space between them gradually increases in width from the end wall 31 to the opposite end wall 32, the object of which will be explained hereinafter. Extending across the trough 35 and located about midway of the height thereof are secured at intervals to its side walls cross-strips 36, and similar cross-strips are secured at a similar distance above the inclined lower wall of the extension 33, and secured upon such cross-strips are a series of longitudinally-disposed slats 37 that are spaced apart so

as to permit soil dislodged from the beets to readily pass through, but close enough together to prevent any of the beets from dropping between the slats. These cross-strips and slats constitute a reticulated false bottom for the hopper that is substantially co-equal therewith in length. Adjacent to the end wall 31 its effective surface, that is to say the surface exposed between the inclined members 34, is comparatively narrow, but, as above indicated, it gradually increases in width toward the opposite end wall 32 until the entire width of the slats is exposed where they form the bottom of the extension member 33. An endless conveyor is provided for this hopper which is movable through the trough 35 of the hopper and through the extension 33. Such conveyor comprises two chains 38 connected at intervals by cross-bars 39, such cross-bars being adapted, as clearly shown in Fig. 6, to move over the longitudinal slats 37 and in close proximity thereto so that, as will be understood, any beets lying on such slats will be swept along. The lower run of the endless conveyor is so positioned with respect to the bottom of the trough 35 and the inclined bottom of the extension 33—which bottoms are smooth and imperforate—that the cross-bars 39 of the conveyor will be very close to or in actual contact with such smooth bottoms, so as to sweep or move therealong the soil that has become dislodged from beets dumped into the hopper, and falling through between the slats 37. Thus, as will be apparent, the endless conveyor of this member of the apparatus is utilized by having its upper run or portion move the beets in the lowermost portion of the mass contained in the hopper in one direction in a substantially horizontal plane, while at the same time its lower run or portion will act to move the soil in the opposite direction. As best shown in Fig. 6, longitudinally-extending angle irons 40 are secured to the lower portions of the side walls of the trough 35 to properly guide the lower run or portion of the conveyor, so that its cross-bars 39 will be held in effective working condition relatively to the bottom of such trough 35. At the point where the conveyor turns upward so as to conform to the upward inclination of the bottom wall of the extension member 33, there are provided idler sprockets 41, 42, as shown in Fig. 4, to hold the conveyor chains in proper position, both with respect to the upper slatted false bottom that the beets rest on and the smooth imperforate bottom of the trough that the soil settles on. Against the inner face of the end wall 31 of the hopper member is provided an inclined deflector plate 40* that, like the inclined walls 34, will direct beets that are thrown into the hopper onto the conveyor.

The side walls of the hopper are in the form of movable members 43 that are hingedly secured at 44 along their lower margins. Any suitable latching means for holding each of these swinging side pieces in upright or closing position may be provided. When, however, beets are to be dumped into the hopper from one side, it is desirable to let the hinged wall at that side swing outward, but at the same time hold it yieldingly so that its upper edge portion will constantly bear against the wagon that is being dumped to discharge its contents into the hopper, the yieldingly held side piece thereby constituting a close connection between the hopper and the wagon that will prevent any beets being lost by falling between the wagon and the side of the hopper. For so holding such side wall there is shown a coiled spring 45 attached to one end of a link 46, which at its other end is pivoted to a bar 47 slidably mounted upon the upper edge of each of the end walls of the hopper. By a shifting of that bar 47 transversely of the hopper, the spring may be utilized in connection with either one of the hinged side walls. This construction of holding either one of the hinged side walls in the manner described is not, however, claimed herein, as it is not jointly our invention, but is the invention of the applicant Thomann, and forms the subject matter of an application filed by him June 29, 1923, Serial No. 648,468.

In practice a wagon load of beets is deposited in the hopper in mass and rests on the conveyor therein, or, more accurately speaking, on the slatted false bottom of the hopper. Such false bottom may, however, be regarded as a part of the conveyor, since it supports the beets being moved by the traveling member of the conveyor. In other words, the slatted or otherwise perforated false bottom, together with the chains 38 and cross-bars 39 constituting the upper flight of the conveyor, cooperate not only to form a perforated false bottom for the hopper, but also an interticed traveling conveyor. When the conveyor, which is relatively long and narrow, starts to move under the mass, the beets resting immediately on the conveyor are drawn along by it under and relatively to the superimposed beets, thereby causing a turmoil or commotion in the mass, which agitation and the consequent attrition of the beets one against another loosens the dirt so that it sifts through the mass and, passing through the conveyor or false bottom, is deposited in the lower portion of the receptacle where it is taken by the lower run or flight of the conveyor and withdrawn from the receptacle toward the right, as viewed in Figures 1 and 4. The beets resting on the upper run of the conveyor are carried along under the mass to the left and pass out of the receptacle to the elevator B, the space occupied by the

beets withdrawn being filled from above by the settling of the mass due to its depletion in the manner described. The latter beets are taken up by the entering portion of the conveyor traveling through the hopper, and in their turn are moved along under the mass until they also leave the hopper. Thus the mass of beets in the hopper is gradually depleted from below as the conveyor travels until finally all the beets are withdrawn. So long as there is more than one layer of beets in the hopper the agitation above described continues, with the result that before they are delivered to the elevator B the beets will have been thoroughly cleansed of adhering dirt. In the meantime the dirt removed from them, as well as any loose earth deposited in the hopper with the beets, will have sifted gradually through the upper run of the conveyor and been conveyed in the opposite direction by the lower run thereof to the point where it is disposed of in the manner hereinafter described.

The endless conveyor used in connection with the hopper member is driven by the following means: On an end portion of the shaft 28 is fixedly secured a sprocket 48 (see Fig. 2) over which runs a sprocket chain 49 that also passes over a sprocket wheel 50 that is fast on one end of a short horizontal shaft 51 that is supported at the upper end of an appropriately-shaped casing 52. In this casing and fast on the shaft 51 is a bevel gear 53 that meshes with another bevel gear 54 fast on a vertical shaft 55 that at its lower end carries another bevel gear 56 that is in mesh with a bevel gear 57 mounted on a short horizontal shaft 58, said shaft 58 being detachably journaled in bearings carried by rigid arms 59 that are bolted to and project up from the extension member 33 of the hopper. Over a sprocket that is also fast on said shaft 58 runs a chain 60 that engages over a sprocket on the projecting end of a shaft 61 that carries the sprockets with which the chains 38 of the conveyor are engaged—the other sprocket over which these conveyor chains run being mounted on a shaft 61ª (see Fig. 5) adjacent to the end wall 31 of the hopper. The casing 52 for the various gear members is additionally supported by braces 62, as shown in Fig. 2, which are bolted to the sides of the elevator B. By reason of the shaft 58 being detachably mounted upon the arms 59, the two principal members A and B of the apparatus can be readily separated for transportation or storage. Also it will be noted that this character of driving construction is in the nature of a swivel connection of the two principal elements A and B, whereby the elevator member is permitted to be turned at any desired angle relatively to the hopper member so as to carry the beets in different directions, which is important particularly when the beets are to be stacked up in long piles. This swivel connection of the two parts, while still maintaining the required operative driving connection, is more fully shown and described in the said Neighbour Patent No. 1,473,795.

The hopper member A, which also includes the comparatively narrow extension 33 thereof, is mounted upon a heavy wheeled frame 63, being secured to such frame in any usual manner, and the frame itself being mounted upon wheels to adapt it to be moved from place to place. The front wheels of the frame are indicated by 64 and that one of the rear wheels that is shown is indicated by 65.

In the construction shown the hopper member is of a length to extend over the greater portion of the wheeled frame, and upon that portion of the supporting frame immediately forward of the end wall 31 of the hopper is secured the third principal element of the mechanism which has been designated generally by C. This element C, in the construction shown, comprises an open or skeleton-like framework which rises to a considerable height, and therefore from its form and height may, for lack of a better name, be termed a tower. The various parts of this tower will be braced and connected together in any usual way so as to form a strong and rigid structure. Depending from the wheeled supporting frame 63 and suitably secured thereto is a heavy boot or receptacle 66 extending transversely of said supporting frame and located against the outer face of the end wall 31 of the hopper, such end wall having in its lower portion a large opening with which the open end of the boot registers so that, as will be plain from an inspection of Fig. 5, the soil that is carried along on the bottom of the trough by the conveyor therein will be swept into the boot. The tower member is equipped with an endless conveyor apparatus comprising two chains 67 spaced at a considerable distance apart, between which chains and supported by them are a series of buckets 68 adapted to be moved through the boot 66 and scoop up the soil that has been deposited therein as stated—the soil so taken up by the buckets being carried up to the top of the tower and dumped into a receptacle that will be hereinafter described. The vertical portions of the path of travel of these conveyor chains are, in the construction shown, opposite the front and rear of the tower member. As shown, these chains pass over two sprockets 69 mounted on a shaft 70 that passes through the boot 66, the other pairs of sprockets being indicated, respectively, by 71, 72, 73, 74 and 75, the several shafts for which are suitably supported by bearings connected with the frame-

work of the tower. The shaft for one of these pairs of sprockets will preferably be mounted in adjustable bearings as usual, as is shown in connection with the shaft for the sprockets 74. The pair of sprockets 71 at the rear upper corners of the tower are considerably higher than the pair of sprockets 73 at the front upper corners of the tower, so as to ensure an overturning of the buckets as they are carried over the tower, and thereby cause the discharge of their contents while over the tower. The pair of sprockets 72 serve to hold the chains in a sharply inclined position while passing over the tower, and thereby ensure the dumping operation being performed, as well as serving to maintain the chains in taut condition. The driving of these endless conveyor chains 67 is accomplished through a drive chain 76 that passes over a sprocket fast on a projecting end portion of the shaft 61^a and around a sprocket that is fast on an end portion of the shaft that the sprockets 75 are mounted on.

In the upper end portion of the tower member C is located a receptacle into which the soil that is carried up by the buckets 68 is deposited when such buckets are turned as hereinbefore described. This receptacle is indicated generally by 77 and is formed in the construction shown with two side walls and a floor, but without any fixed end walls. The end portions of its floor, however, are hingedly connected at 78, 78 to the fixed central portion 79 of such floor. These outer hinged portions of the floor are each indicated by 80. Each hinged section 80 is adapted when turned to stand at substantially an angle of 45° to have its outer marginal portion come approximately to the upper margins of the side walls, and will, when secured in such position, constitute an end closure for the receptacle 77. As shown, it is adapted to be secured in such inclined position by a rod 81 that can be passed through alined holes 82 in the side walls. It is contemplated that only one such movable section 80 shall be turned up at the same time and secured in the inclined position shown at the left hand side of Fig. 10, whereby the other end of the receptacle is left open for the discharge of soil therefrom when the receptacle is tilted as hereinafter described. The provision of this sharply inclined floor member, secured in that position as stated, serves not only as a closure for one end, but acts, as will be understood, to direct the soil that may be dumped into the receptacle toward the open end, so that when the device is to be tilted to discharge the contents from that open end the weight of the soil between that open end and the central pivot on which the device turns will be so much greater than the weight at the other side of said pivot as to very greatly aid in the tilting operation. By having the two pivoted sections 80, the one at either end may be utilized as an inclined closure member so that the dumping of the contents may be effected at either side of the tower as may be more convenient.

At opposite sides of the central portion of the fixed member 79 of the floor are two heavy depending brackets 82^a which are riveted to the angle iron sections that stiffen the marginal portions of the floor, and through these depending brackets passes a shaft 83 upon opposite end portions of which are mounted wheels 84 that respectively rest upon tracks 85 extending transversely of the tower and secured to the front and rear upright members of such tower. Each of these tracks 85 inclines outwardly and downwardly from a central point, as clearly shown in Figs. 1, 2 and 11. When in horizontal or soil-receiving position the receptacle 77 will have its wheels 84 resting substantially upon the highest points of these tracks 85, as clearly shown in Figs. 1 and 2, and while as will presently be explained other wheels carried by the receptacle and running upon other tracks aid in sustaining the weight of the receptacle and its contents, the chief reliance for this is placed upon the wheels 84 and their tracks—the other wheels and tracks referred to serving principally as guiding and steadying means in the dumping operations. Such other wheels are four in number, and are each indicated by the reference numeral 86. One of these wheels 86 is located adjacent to each lower corner of the receptacle 77, being rotatably mounted upon a pin projecting from the adjacent wall of the receptacle. Two downwardly diverging tracks 87 are provided at each side of the tower and, in the construction shown, they are riveted to the upright members and upper cross-bars of such tower. Upon each one of these tracks one of the wheels 86 is adapted to run. The tracks of each pair are inclined downwardly in the same manner that the two branches of each track 85 are, but, as is clearly shown in Figs. 2 and 11, they are considerably more sharply inclined than are the branches of the tracks 85 whereby, as will be evident from an inspection of Fig. 11, when the receptacle is moved down into tilting position it will be given a sharp downward inclination to better ensure a complete discharge of its contents. During such dowward tilting movement the receptacle will be free to turn as required about the shaft 83 as an axis, as will be understood, and, as shown in Fig. 11, at the completion of its tilting movement the wheels 86 that are at the discharge end of the receptacle will have passed clear of the tracks 87, and the supporting wheel 84 will have traveled only a part of the distance down on the member of the track 85 that it runs upon so that it still furnishes a solid support for the receptacle. The outer end portions of the tracks 87 are curved downwardly, as shown, to facilitate the wheels 86

passing off from and returning to such tracks during the movements of the receptacle. Arranged above and parallel with the tracks 87 are rails 88 that are secured rigidly to the framework of the tower, which rails are so positioned as to lie over and engage with the wheels 86 so as to hold the wheels 86 that are in the upermost position during the dumping operation of the receptacle from leaving their tracks. For properly stopping the turning movement of the receptacle when it has passed a proper dumping position, as in Fig. 11, we provide cross-strips 89 that are riveted between upright members of the tower, against one of which cross-strips the reinforced upper edges of the side walls of the receptacle 77 will strike. For returning the receptacle 77 to proper load-receiving position after each dumping operation, we provide a strong coiled spring 90 which, as shown, is attached at one end to the central portion of one of the cross-beams of the tower and at its other end is connected through a link 91 with the shaft 83 of the supporting wheels 84. Such a spring will preferably be employed at each side of the receptacle and these springs will by their pull ordinarily be sufficient to cause a return to load-receiving position after each dumping operation, but if such springs do not so function immediately upon the discharge of the load, it will only be necessary for an attendant to give a short upward push on the depending downturned end of the receptacle, whereupon the springs will function to complete the return movement.

To hold the receptacle 77 in its approximately horizontal or soil-receiving position, two transversely disposed pivoted levers 92 are provided which are located across one end of the tower structure, each lever being pivoted at one end to one of the upright corner members of the tower, such pivotal points being indicated by 93. The free ends of these levers project respectively beyond the sides of the tower, so as to be operable by an attendant who will ordinarily be on a wagon into which the soil from the receptacle is to be dumped. Each lever carries affixed to it a downwardly extending plate 94, which plates, when the receptacle 77 is in soil-receiving position, lie at opposite sides of the shaft 83 and serve as latches to prevent the wheels on that shaft from rolling in either direction on the tracks 85. Each of the adjacent upright members of the tower have secured to them slotted keeper plates 95 through which the free ends of the latch levers respectively project. When it is desired to dump the contents of the receptacle, the free end of that lever which is pivoted at the opposite side of the tower from that toward which the receptacle is to tilt into dumping position is to be moved up, which movement will release the latch carried by such lever from its engagement with the shaft, and thereupon the receptacle will tilt downward in the manner hereinbefore described—the excess of weight of material at that side of the center of the receptacle being ordinarily sufficient to ensure the dumping movement, but if for any reason the receptacle does not so move, a slight pull by the attendant will readily start it. When the empty receptacle moves back under the action of the springs 90, the lever 92 that has previously been used to release it will be forced up by contact of the shaft 83 with the beveled lower edge of the latch on that lever, as will be understood, and as such shaft passes that latch the lever will drop and the receptacle thus be held again in locked position. As will be readily understood from the construction described, the contents of the receptacle 77 can be discharged equally well at either side of the tower and, according to the side at which the dumping is to be effected, one or the other of the hinged sections 80 of the floor will be raised as hereinbefore explained.

While of course the beets to be acted upon may be placed in the hopper member A in any desired manner, it is preferable from many standpoints to so tilt the wagon that brings them to the apparatus as to deposit the whole wagon load in the hopper at one operation, and to that end we have shown in Fig. 1 a wagon hoist that is indicated generally by the reference letter D and comprising a wide derrick-like frame that straddles the hopper and between one upright member of which and the hopper a wagon is adapted to be driven, and then, by means of the flexible connection that is carried by the wagon hoist, so tipped as to discharge its load into the hopper. As such wagon hoist, however, may be of any desired construction, and is not essential to an embodiment of our improvements both as to mechanism and method, it is not deemed necessary to here enter into a detailed description of the construction thereof. We call attention, however, to the fact that by means of a shaft 96 that is connected at one end by a universal coupling with a driven shaft on the supporting frame 16, and by another universal coupling with a shaft carrying one of the gear members that control the movements of the flexible lifting element of the wagon hoist, such hoisting apparatus can be driven from the same source of power as the endless conveyors in the three members A, B and C of the apparatus—a suitable clutch being employed of course in connection with the wagon hoist mechanism, as the power for such hoisting is only required at intervals. It is because of the fact that the beets will ordinarily be dumped into the hopper directly from a wagon that we prefer to employ a construction of hopper that comprises the hinged sides 43 that will have their upper edge portions always held by the

springs 45 in close contact with the side of the wagon that is being dumped.

Attention has been called to the fact that the inclined bottoms 34 that direct the beets into the trough 35 and upon the slatted raised floor thereof are so shaped as to provide a space between them that gradually widens in the direction of movement of the upper run of the conveyor in that hopper. The object of this construction is to prevent the clogging and probable mutilation of the beets that might occur if the space between the inclined bottoms 34 were of uniform width from end to end of the hopper. With the gradually widening space that is provided the beets at the bottom of the mass, notwithstanding the weight of the superimposed beets, do not wedge or bind, but may be moved along uniformly and with practically no damage to them.

The operation of the several members of the mechanism has been rather ful', described in connection with the description of the structures, and it is therefore believed not necessary to here describe the operation of the mechanism as a whole, but it will be appreciated that by the operation of the several conveyor elements a load of beets deposited in the hopper in the manner described will be cleansed from dirt by the method hereinbefore described, and that the cleansed beets will be gradually conveyed from the hopper and deposited in the lower end of the elevator B to be conveyed to the desired point. The soil dislodged from the beets will sift through between the slats 37 of the raised or false bottom on which the beets travel, and will be deposited upon the smooth surface of the real bottom of the trough in the hopper and be engaged and swept in the opposite direction by the lower run of the conveyor and deposited in the boot that the buckets of the conveyor on the tower move through, and thus be carried up by such buckets and deposited in the movable receptacle 77 in the upper portion of the tower. It will be noted that the apparatus described operates to deliver the mass of beets to the elevator B gradually, and also to gradually remove from the space below the hopper the soil removed from the beets and deliver it to the hoisting mechanism in the tower member C, and this gradual movement of the beets and soil is an important feature of our invention. It would require a very large, strong apparatus to elevate the beets as a mass, and it would also require a very strong, heavy mechanism to move in one mass all of the loose earth removed from the beets. By doing this work gradually, however, the burden imposed on the apparatus is greatly reduced, and it becomes practicable to effect the delivery of the beets in one direction and of the soil in another direction by the use of a single endless conveyor. By the time the load of beets that was deposited in the hopper has been passed on to and elevated by the conveyor in the elevator B, the soil from such beets will have been deposited in such raised receptacle so that the wagon that brought the beets to the apparatus can be moved into position to have the soil in the said receptacle dumped into the wagon. The beet grower thus is assured of having returned to him the full weight of the soil that has been separated from his particular load of beets and is thus enabled to accurately check the net weight of the load of beets that he has delivered.

The thorough separation of the soil from the beets is highly desirable also because of the fact that if beets with soil adhering to them are allowed to remain in piles for a considerable time they are more apt to spoil by reason of becoming heated and fermentation setting in, whereas with the soil removed spaces for the circulation of air between the beets will be provided.

It should be understood that the term "false bottom" as herein used is intended to comprehend any suitable means underlying the mass of beets in the hopper and serving to support the same while permitting the dirt removed from the beets to pass through it, whether such false bottom be a moving part of the conveyor by which the lowermost beets are withdrawn from the hopper or not, although we prefer to use a stationary false bottom as shown and described.

What we claim as our invention and desire to secure by Letters Patent, is—

1. An apparatus for separating dirt from beets and like articles, comprising in combination a horizontally elongated receptacle adapted to contain the articles in mass, means underlying and forming a horizontally elongated bottom for said receptacle which supports the articles therein in mass while permitting matter separated from such articles to pass therethrough, means under said receptacle for removing the separated material, and means for moving the lowermost of such articles longitudinally of said receptacle substantially horizontally under and relatively to the mass of overlying articles, and out of the receptacle.

2. An apparatus for separating dirt from beets and like articles, comprising in combination a horizontally elongated receptacle adapted to contain the articles in mass, a substantially horizontal elongated reticulated false bottom for said receptacle, that serves to support the articles therein in mass while permitting matter separated from such articles to pass therethrough, means under said receptacle for removing the separated material, and means for continuously moving the lowermost of such articles longitudinally of said false bottom substantially horizontally under and relatively to the mass of articles

superimposed thereon, and out of the receptacle.

3. An apparatus for separating dirt from beets and like articles, comprising in combination a horizontally elongated receptacle adapted to contain the articles in mass, a substantially horizontal reticulated false bottom for said receptacle substantially coequal in length therewith and serving to support the articles therein in mass, and means for continuously moving the lowermost of the mass of articles within said receptacle longitudinally of said false bottom substantially horizontally under and relatively to the articles superimposed in mass thereon, and out of the receptacle.

4. An apparatus for separating dirt from beets and like articles, comprising in combination a horizontally elongated receptacle adapted to contain the articles in mass, a substantially horizontal elongated reticulated false bottom for said receptacle that serves to support the articles therein while permitting matter separated from such articles to pass therethrough, and an endless conveyor having its upper flight arranged to move substantially horizontally longitudinally of said false bottom to move the lowermost of the mass of articles within the receptacle longitudinally of the false bottom under and relatively to the articles superimposed in mass thereon, and out of the receptacle.

5. An apparatus for separating dirt from beets and like articles, comprising in combination a horizontally elongated receptacle having downwardly converging side members, a substantially horizontal reticulated false bottom extending longitudinally of said receptacle adjacent to the lower margins of said side members, and adapted to support the articles in said receptacle in mass while permitting matter separated from such articles to pass therethrough, and means for moving the lowermost of such articles longitudinally of said false bottom substantially horizontally under and relatively to the articles superimposed in mass thereon, and out of the receptacle.

6. An apparatus for separating dirt from beets and like articles, comprising in combination a horizontally elongated receptacle having downwardly converging side members, a substantially horizontal reticulated false bottom extending longitudinally of said receptacle adjacent to the lower margins of said side members, and adapted to support the articles in said receptacle in mass while permitting matter separated from such articles to pass therethrough, an endless conveyor having its upper flight arranged to move longitudinally of said false bottom to move the articles thereon substantially horizontally under and relatively to the articles superimposed in mass thereon, and out of the receptacle.

7. In an apparatus of the class described, the combination with an elongated receptacle having downwardly converging side members, the lower marginal portions of said side members being arranged to diverge in the direction of movement of the articles, of a reticulated false bottom extending longitudinally of said receptacle adjacent to the lower margins of said side members, and adapted to support the articles in said receptacle in mass, and means for moving the lowermost of such articles longitudinally of said false bottom under and relatively to the mass of articles superimposed thereon, and out of the receptacle.

8. In an apparatus of the class described, the combination with an elongated receptacle having downwardly converging side members, the lower marginal portions of said side members being arranged to diverge in the direction of movement of the articles, of a reticulated false bottom extending longitudinally of said receptacle adjacent to the lower margins of said side members, and adapted to support the articles in said receptacle in mass, an endless conveyor having its upper flight arranged to move longitudinally of said false bottom to move the articles thereon under and relatively to the mass of superimposed articles, and out of the receptacle.

9. An apparatus for separating dirt from beets and like articles, comprising in combination a horizontally elongated receptacle adapted to contain the articles to be treated, a stationary substantially horizontal reticulated false bottom for said receptacle adapted to support the articles in mass while permitting matter separated from such articles to pass therethrough, means for continuously moving the articles on said false bottom substantially horizontally longitudinally of and out of the receptacle, and means for continuously removing the matter separated from said articles, in the opposite direction.

10. An apparatus for separating dirt from beets and like articles, comprising in combination a horizontally elongated receptacle adapted to contain the articles to be treated, a stationary substantially horizontal reticulated false bottom for said receptacle adapted to support the articles in mass while permitting matter separated from such articles to pass therethrough, and an endless conveyor having its upper flight arranged to move the articles on said false bottom longitudinally of and out of said receptacle, and a trough below said receptacle for the reception of the matter removed from said articles, the lower flight of said conveyor being arranged to move such matter longitudinally of said trough in a direction opposite to that in which the articles are moved.

11. An apparatus for separating dirt from beets and like articles, comprising in combi-

nation a frame, a horizontally elongated hopper mounted on said frame, said hopper being open at the top; a substantially horizontal reticulated false bottom for said hopper extending throughout the length thereof, and adapted to support the articles in said hopper, a trough mounted on said frame under said false bottom to receive the matter separated from the articles in the hopper, and means carried by said frame for moving the lowermost articles in said hopper substantially horizontally longitudinally thereof to withdraw them from the hopper, and means for continuously removing the matter deposited in said trough.

12. An apparatus for separating dirt from beets and like articles, comprising in combination a frame, a horizontally elongated hopper mounted on said frame, said hopper being open at the top, a substantially horizontal reticulated false bottom for said hopper extending throughout the length thereof, and adapted to support the articles in said hopper, a trough mounted on said frame under said false bottom to receive the matter separated from the articles in the hopper, means carried by said frame for moving the lowermost articles in said hopper substantially horizontally longitudinally thereof to withdraw them from the hopper, and means for continuously removing in the opposite direction the matter deposited in said trough.

13. An apparatus for separating dirt from beets and like articles, comprising in combination a frame, a horizontally elongated hopper mounted on said frame, said hopper being open at the top, a substantially horizontal reticulated false bottom for said hopper extending throughout the length thereof, and adapted to support the articles in said hopper, a trough mounted on said frame under said false bottom to receive the matter separated from the articles in the hopper, and a conveyor for moving the lowermost articles in said hopper substantially horizontally longitudinally thereof to withdraw them from the hopper, and for continuously removing in the opposite direction the matter deposited in said trough.

14. In an apparatus of the class described, the combination with a frame, of an elongated hopper mounted on said frame, said hopper being open at the top, a reticulated false bottom for said hopper extending throughout the length thereof, and adapted to support the articles in said hopper, a trough mounted on said frame under said false bottom to receive the matter separated from the articles in the hopper, means carried by said frame for moving the lowermost articles in said hopper longitudinally thereof to withdraw them from the hopper, means for continuously removing in the opposite direction the matter deposited in said trough, elevating means mounted on said frame for receiving and elevating the matter deposited in said trough, and a tiltable receptacle supported by said frame and arranged to receive the material from said elevating means.

15. In an apparatus of the class described, the combination with a frame, of an elongated hopper mounted on said frame, said hopper being open at the top, a reticulated false bottom for said hopper extending throughout the length thereof and adapted to support the articles in said hopper, a trough mounted on said frame under said false bottom to receive the matter separated from the articles in the hopper, a conveyor for moving the lowermost articles in said hopper longitudinally thereof to withdraw them from the hopper, and for continuously removing in the opposite direction the matter deposited in said trough, elevating means mounted on said frame for receiving and elevating the matter deposited in said trough, and a tiltable receptacle supported by said frame and arranged to receive the material from said elevating means.

16. An apparatus for separating dirt from beets and like articles, comprising in combination a supporting frame, a stationary hopper mounted thereon and adapted to contain a mass of beets, a tower mounted on said frame, a tiltable receptacle mounted on said tower and adapted to discharge into a vehicle alongside the same, an elevator for delivering dirt to said receptacle, and means carried by said frame and operating to effect the separation of the dirt from the beets and to deliver the dirt to said elevator.

17. In an apparatus of the class described, the combination with a supporting frame, of a stationary hopper mounted thereon and adapted to contain a mass of beets, a tower mounted on said frame, a receptacle mounted on the tower and arranged to tilt toward either side of said frame, an elevator for delivering dirt to said receptacle, and means carried by said frame and operating to effect the separation of the dirt from the beets and to deliver the dirt to said elevator.

18. In an apparatus of the class described, the combination with a supporting frame, of a stationary hopper mounted thereon and adapted to contain a mass of beets, a tower mounted on said frame, a tiltable receptacle mounted on said tower, an elevator for delivering dirt to said receptacle, comprising an endless conveyor traveling over said receptacle, and buckets carried by said conveyor and arranged to dump their contents thereinto, and means carried by said frame and operating to effect the separation of the dirt from the beets and to deliver the dirt to said elevator.

19. In an apparatus of the class described, the combination with a supporting frame, of a stationary hopper mounted thereon and adapted to contain a mass of beets, a tower

mounted on said frame, oppositely inclined tracks mounted on said tower at opposite sides thereof, a receptacle supported and guided by said tracks to tilt toward either side of the frame, means for holding said receptacle in a horizontal position and operable to permit the same to tilt in either direction, and means carried by said frame for separating the dirt from the beets and delivering it to said receptacle.

20. In an apparatus of the class described, the combination with a supporting frame, of a stationary hopper mounted thereon and adapted to contain a mass of beets, a tower mounted on said frame, oppositely inclined tracks at opposite sides of said tower, a receptacle having centrally disposed wheels adapted to run on said tracks, whereby said receptacle may tilt to discharge its load at either side of the frame, means for limiting the tilting of said receptacle in either direction, means for holding said receptacle in its load receiving position, and means carried by said frame for separating the dirt from the beets and delivering it to said receptacle.

21. In an apparatus of the class described, the combination with a supporting frame, of a stationary hopper mounted thereon and adapted to contain a mass of beets, a tower mounted on said frame, oppositely inclined tracks at opposite sides of said tower, a receptacle having centrally disposed wheels adapted to run on said tracks, whereby said receptacle may tilt to discharge its load at either side of the frame, wheels carried by the opposite end portions of said receptacle, oppositely inclined pairs of tracks between which the latter wheels run, means for holding the receptacle in its load receiving position, and means carried by said frame for separating the dirt from the beets and delivering it to said receptacle.

22. In an apparatus of the class described, the combination with a supporting frame, of a stationary hopper mounted thereon and adapted to contain a mass of beets, a tower mounted on said frame, a tiltable receptacle mounted on said tower to tilt in opposite directions from its load receiving position, said receptacle having a bottom comprising hinged end portions adapted to swing upward to form ends for said receptacle, means for normally holding said receptacle in its load receiving position, and means carried by said frame for separating the dirt from the beets and delivering it to said receptacle.

23. In an apparatus of the class described, the combination with a supporting frame, of a stationary hopper mounted thereon and adapted to contain a mass of beets, a tower mounted on said frame, a receptacle mounted on said tower to tilt toward either side of the frame, means for normally holding said receptacle in its load receiving position, a spring operating to aid in returning said receptacle to its normal position after the tilting thereof in either direction, and means carried by said frame for separating the dirt from the beets and delivering it to said receptacle.

24. In an apparatus of the class described, the combination with a supporting frame, of a stationary hopper mounted thereon and adapted to contain a mass of beets, a tower mounted on said frame, a receptacle mounted on said tower to travel toward either side thereof and simultaneously tilt to discharge its load, means for holding said receptacle in its load receiving position and operable to permit the receptacle to travel and tilt in either direction, and means carried by said frame for separating the dirt from the beets and delivering it to said receptacle.

25. In an apparatus of the class described, the combination with a supporting frame, of a stationary hopper mounted thereon and adapted to contain a mass of beets, a tower mounted on said frame, a receptacle mounted on said tower to travel toward either side thereof and simultaneously tilt to discharge its load, means for holding said receptacle in its load receiving position and operable to permit the receptacle to travel and tilt in either direction, a spring operating to return the receptacle to its load receiving position, and means carried by said frame for separating the dirt from the beets and delivering it to said receptacle.

26. In an apparatus of the class described, the combination with a supporting frame, of a stationary hopper mounted thereon and adapted to contain a mass of beets, a tower mounted on said frame, a receptacle mounted on said tower to travel toward either side thereof and simultaneously tilt to discharge its load, means for holding said receptacle in its load receiving position and operable to permit the receptacle to travel and tilt in either direction, means for limiting the tilting movement of said receptacle, and means carried by said frame for separating the dirt from the beets and delivering it to said receptacle.

27. In an apparatus of the class described, the combination with a supporting frame, of a stationary hopper mounted thereon and adapted to contain a mass of beets, a tower mounted on said frame, a receptacle mounted on said tower to travel toward either side thereof and simultaneously tilt to discharge its load, means for holding said receptacle in its load receiving position and operable to permit the receptacle to travel and tilt in either direction, a spring operating to return the receptacle to its load receiving position, means for limiting the tilting movement of said receptacle, and means carried by said frame for separating the dirt from the beets and delivering it to said receptacle.

28. The method of handling beets and like articles to remove therefrom the dirt adhering thereto and to deliver the dirt and the beets separately in a dry state, which consists in dumping a mass of the uncleansed beets into a suitable horizontally elongated receptacle, supporting the mass of beets in such receptacle from below so as to permit the dirt separated therefrom to escape from the receptacle by gravity, and moving the beets constituting the lowermost stratum substantially horizontally from under the mass superimposed thereon and out of the receptacle, thereby inducing a commotion in the mass, with consequent loosening of the dirt adhering to the beets, by agitation and the attrition of the beets one upon another.

29. The method of handling beets and like articles to remove therefrom the dirt adhering thereto and to deliver the dirt and the beets separately in a dry state, which consists in dumping a mass of the uncleansed beets into a suitable horizontally elongated receptacle, supporting the mass of beets in such receptacle from below so as to permit the dirt separated therefrom to escape from the receptacle by gravity, moving the beets constituting the lowermost stratum substantially horizontally from under the mass superimposed thereon and out of the receptacle, thereby inducing a commotion in the mass, with consequent loosening of the dirt adhering to the beets, by agitation and the attrition of the beets one upon another, and meanwhile removing the dirt separated from the beets from below the receptacle.

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FREDERICK A. THOMANN.

July 26, 1949.

G. LA MOTTE

HARVESTER WITH INTERMITTENTLY DRIVEN PLANT CUTTER AND CONVEYER

✓2,477,068

Filed April 22, 1946

10 Sheets-Sheet 1

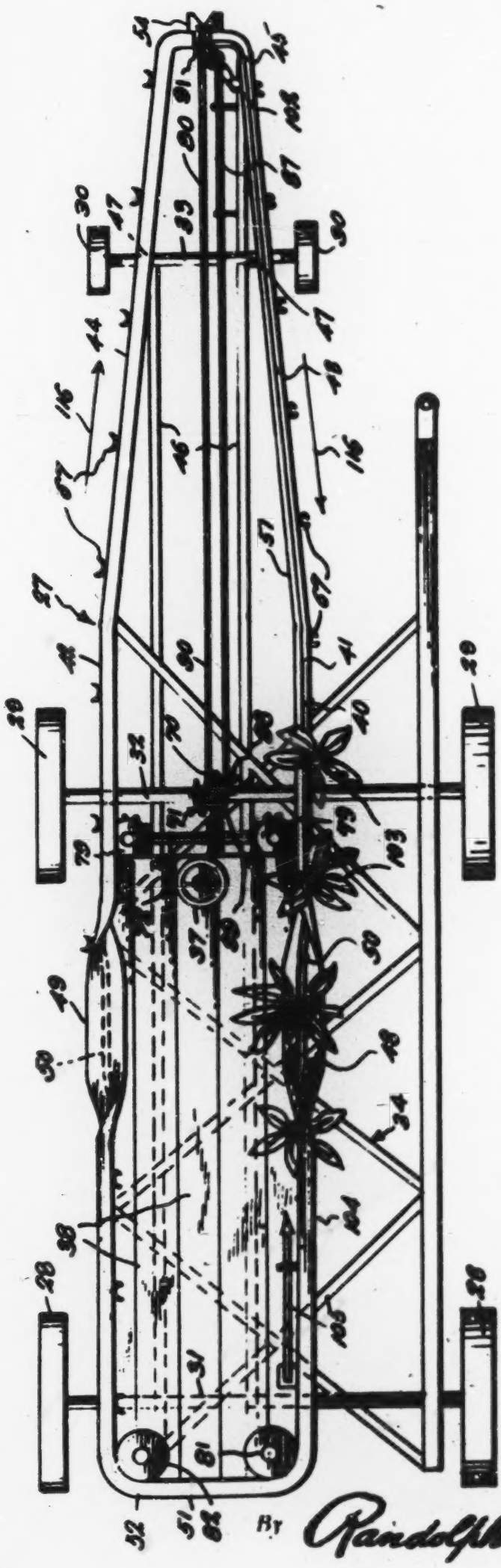

Fig. 1.

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July 26, 1949. G. LA MOTTE 2,477,068

HARVESTER WITH INTERMITTENTLY DRIVEN PLANT CUTTER AND CONVEYER

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Fig. 2.A.

Fig. 2.

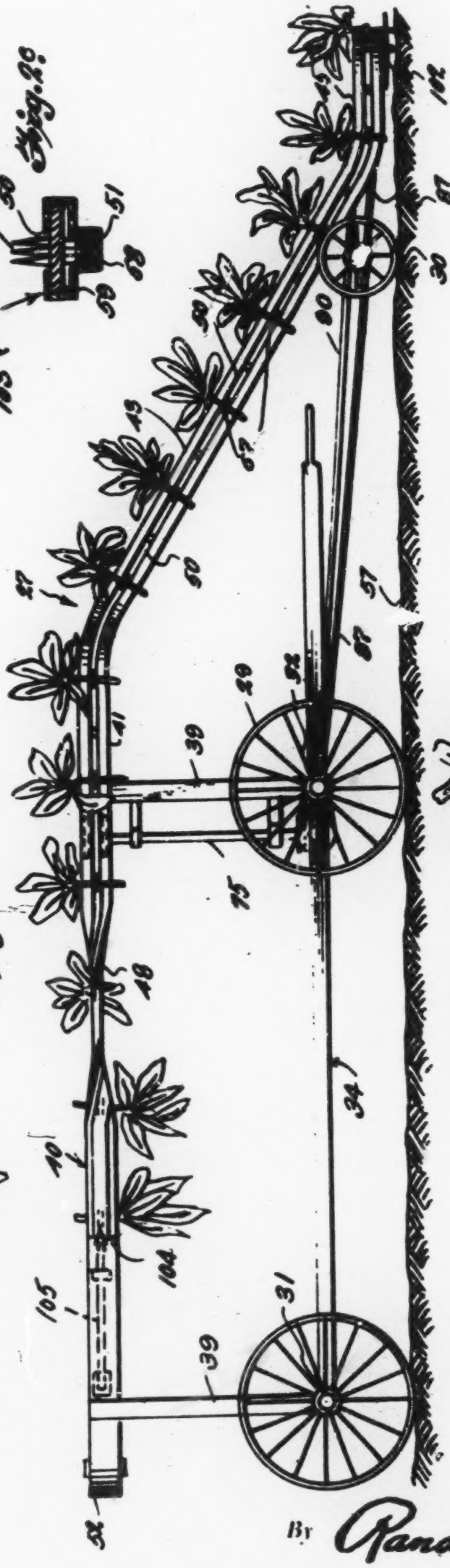

Fig. 2.B.

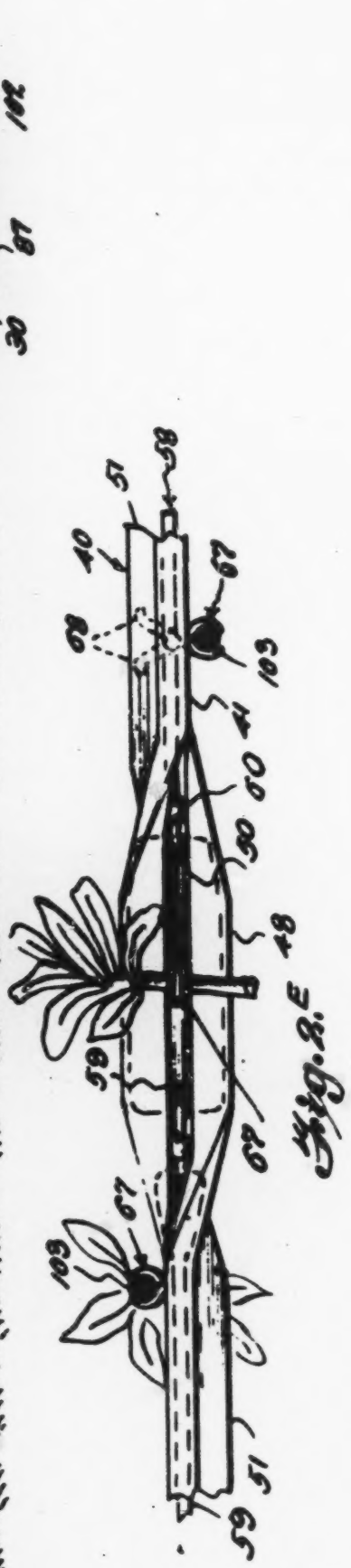

Fig. 2.E.

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HARVESTER WITH INTERMITTENTLY DRIVEN PLANT CUTTER AND CONVEYER

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Fig. 4.

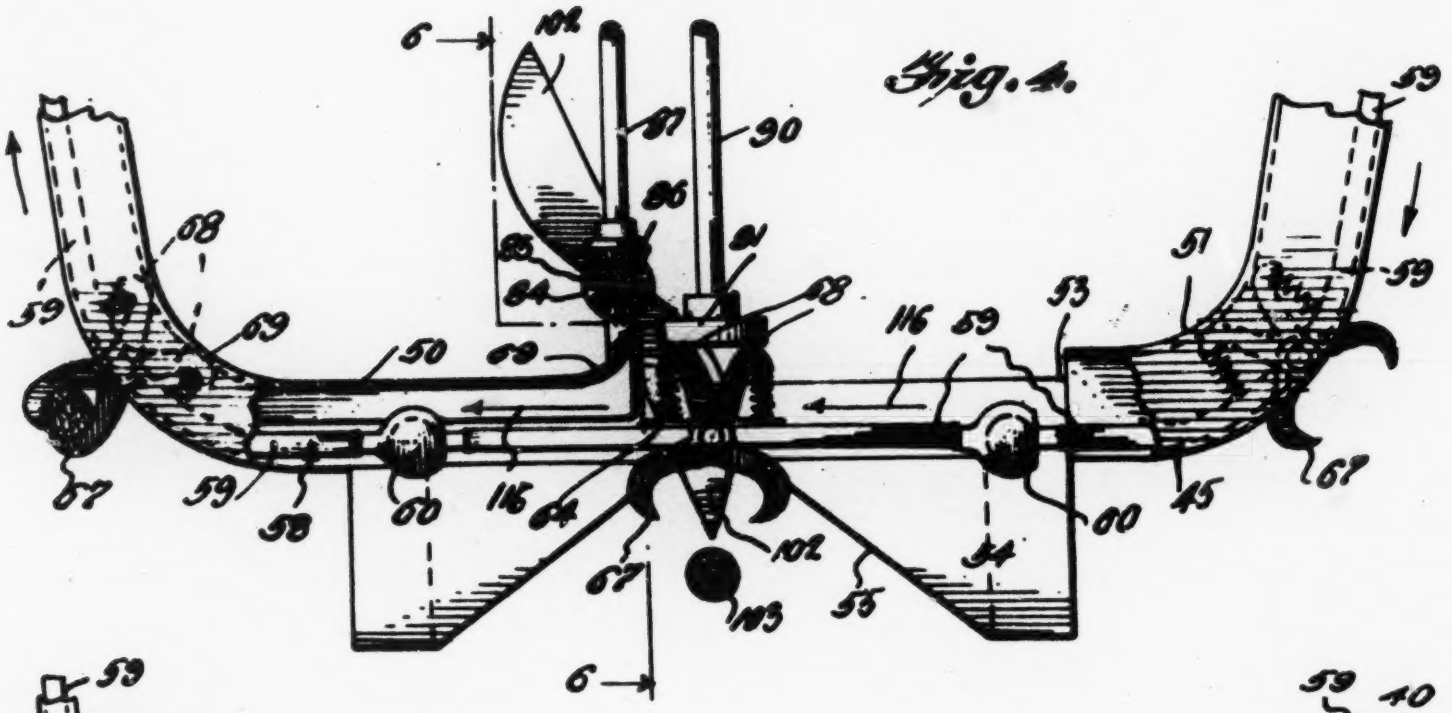


Fig. 5.

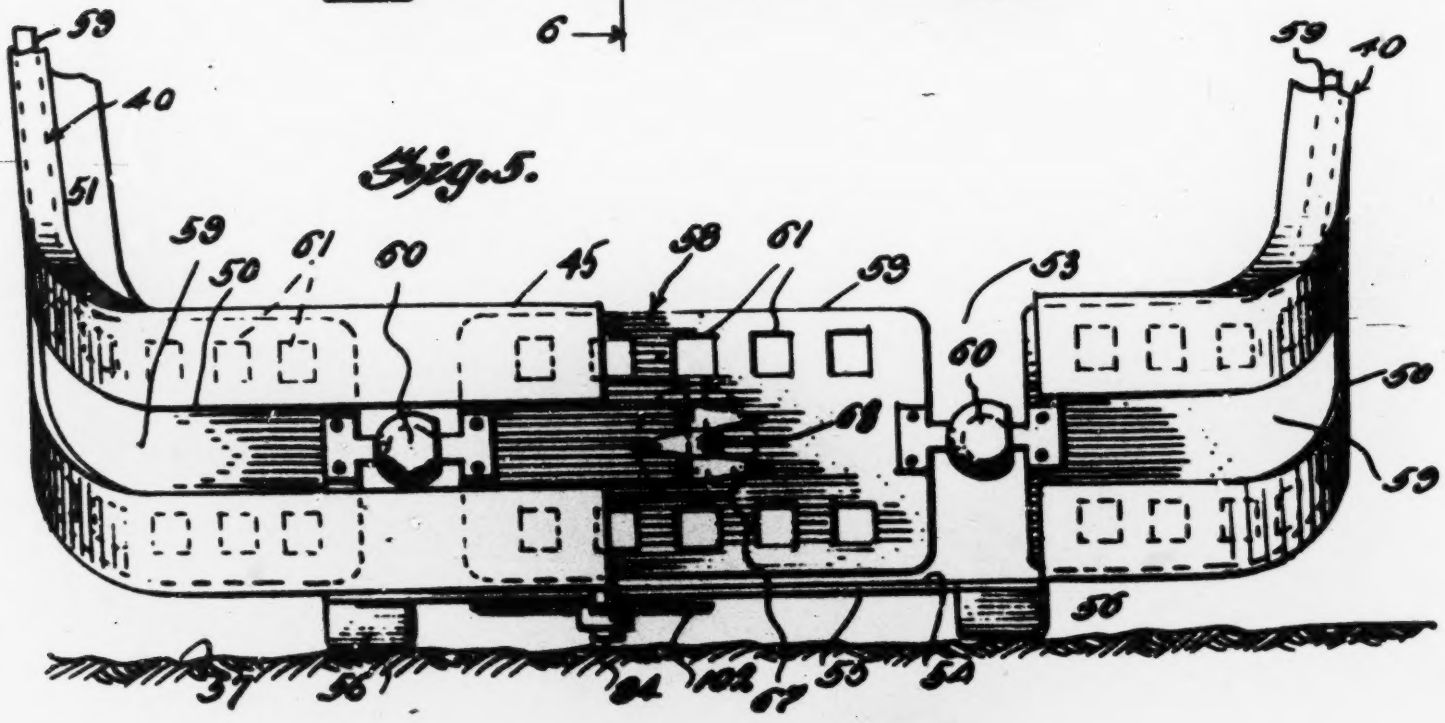
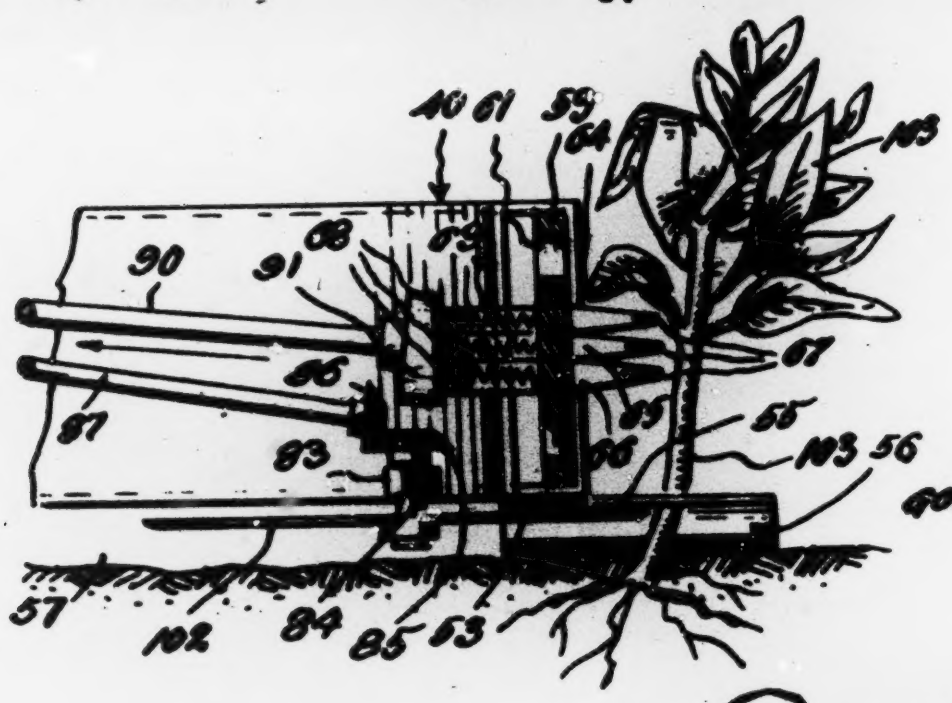


Fig. 6.



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HARVESTER WITH INTERMITTENTLY DRIVEN PLANT CUTTER AND CONVEYER

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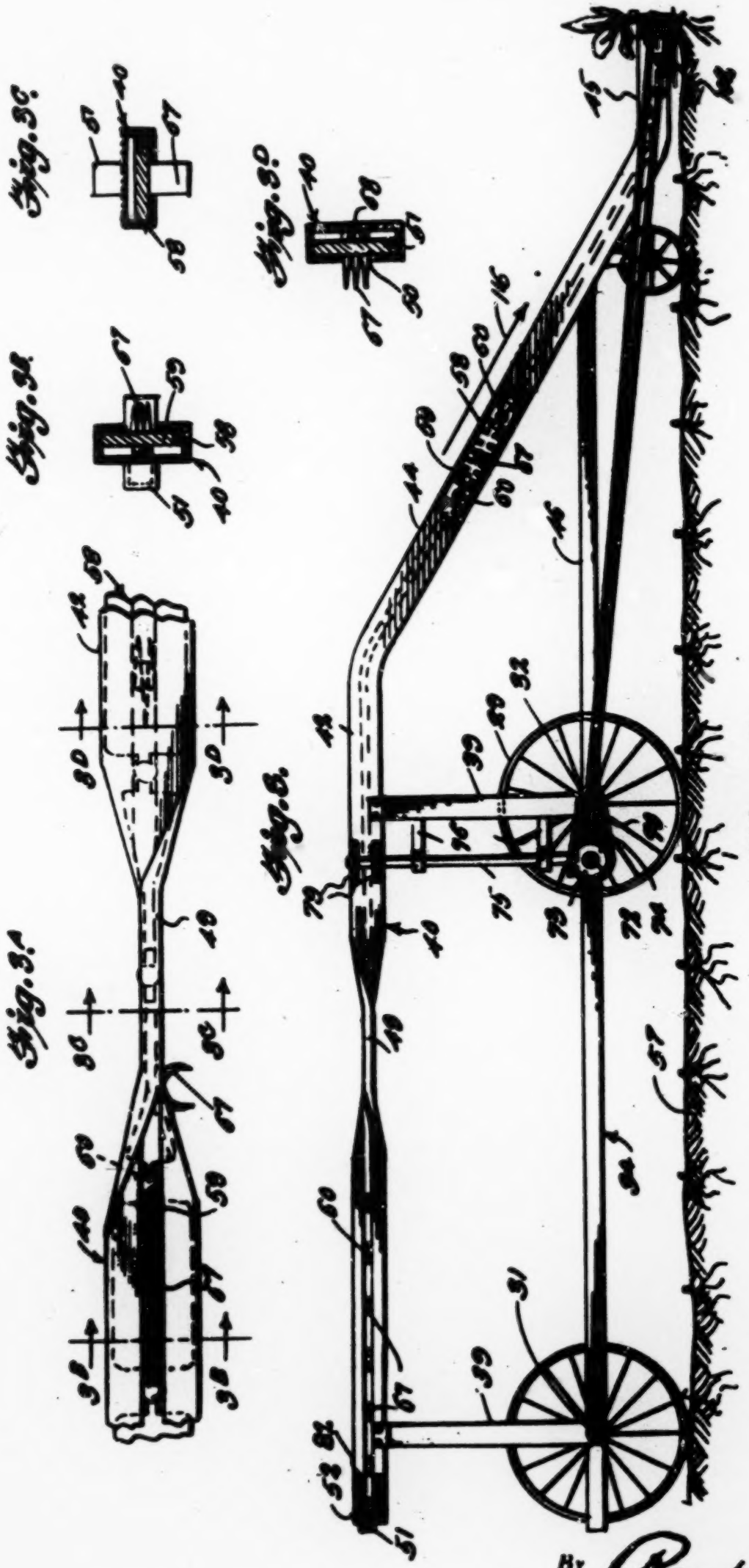

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HARVESTER WITH INTERMITTENTLY DRIVEN PLANT CUTTER AND CONVEYER

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Fig. 7.

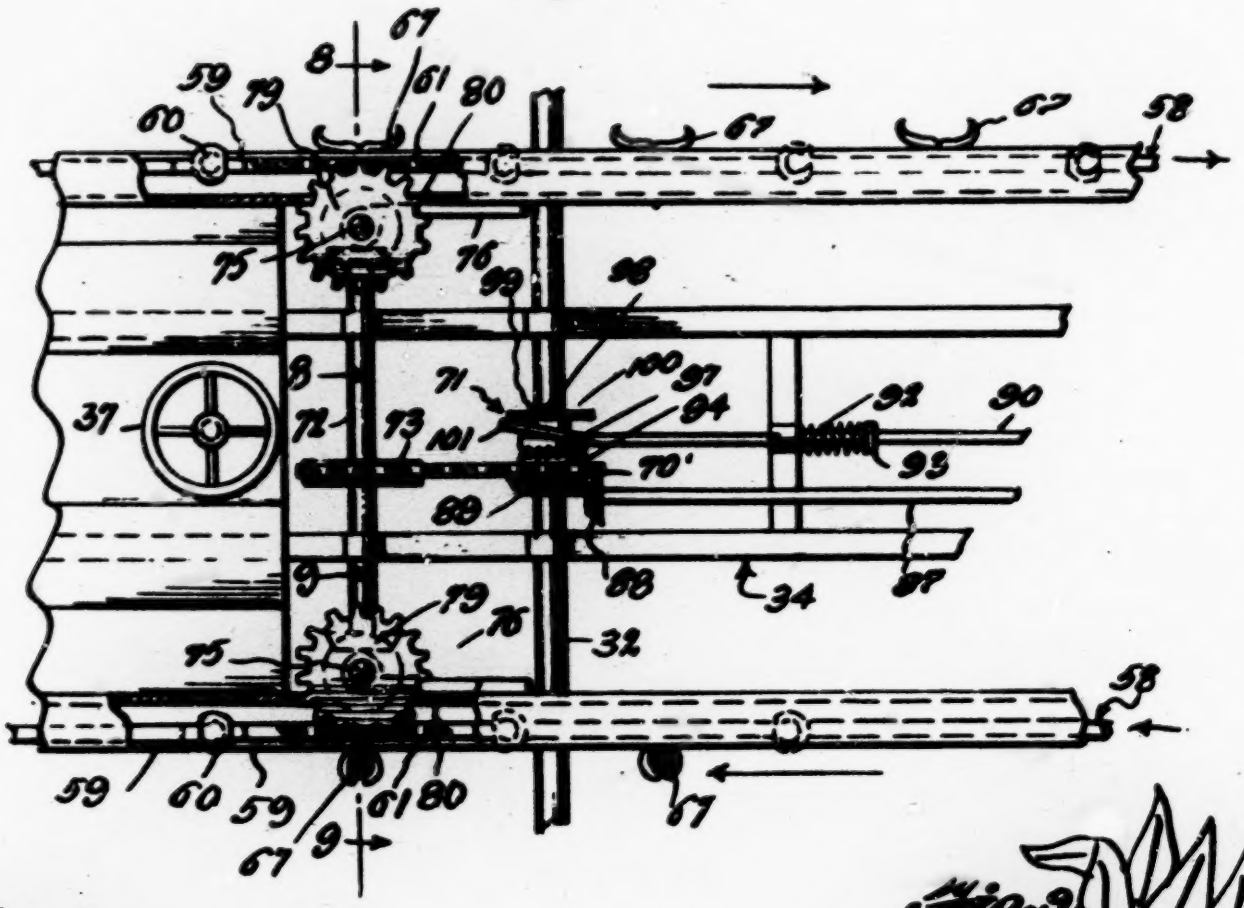


Fig. 8.

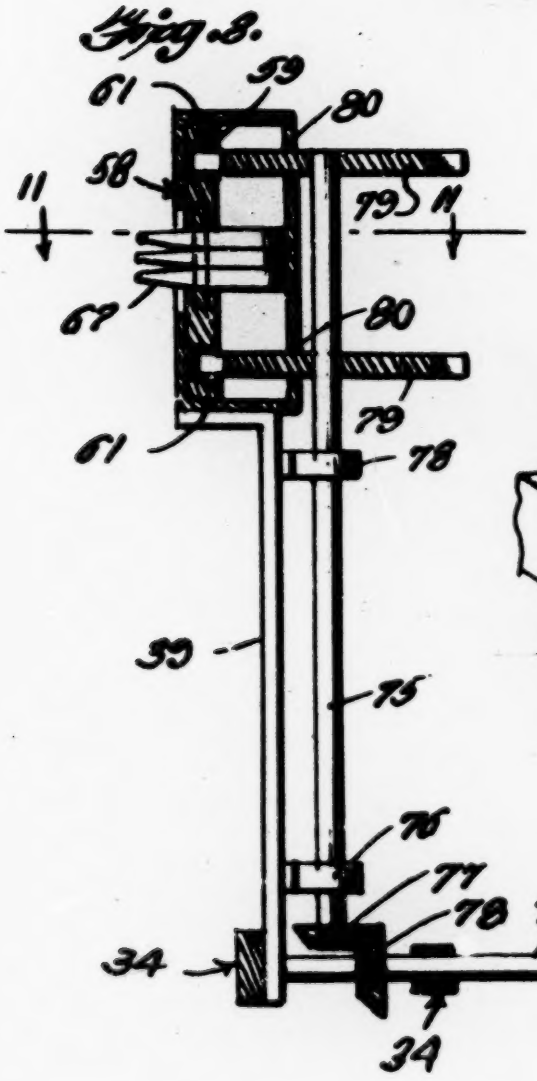


Fig. 10.

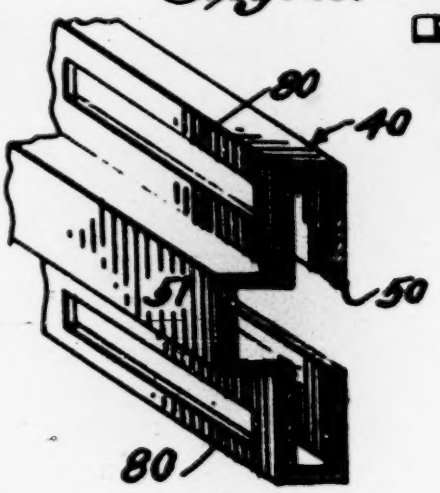
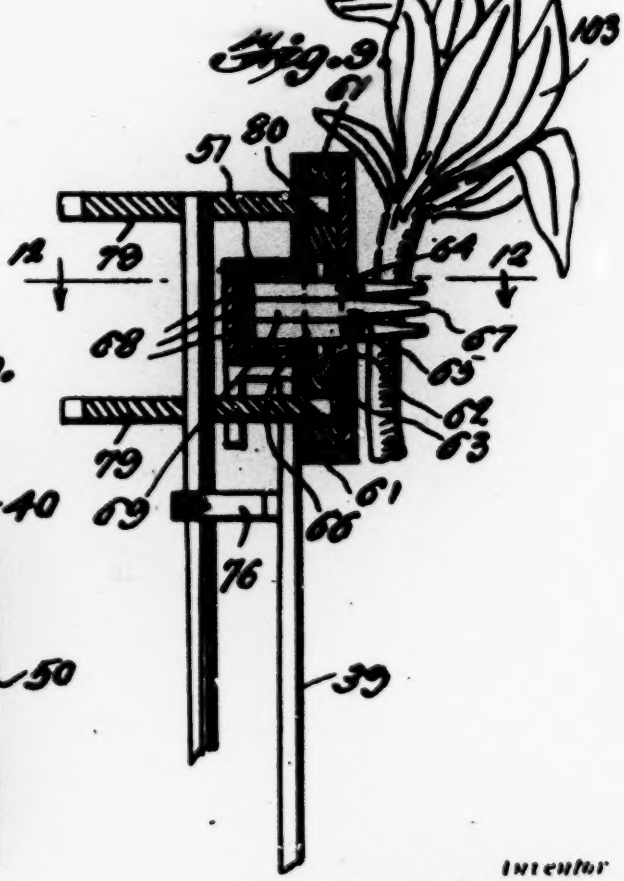


Fig. 9.



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July 26, 1949. G. LA MOTTE 2,477,068

HARVESTER WITH INTERMITTENTLY DRIVEN PLANT CUTTER AND CONVEYER

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Fig. 11.

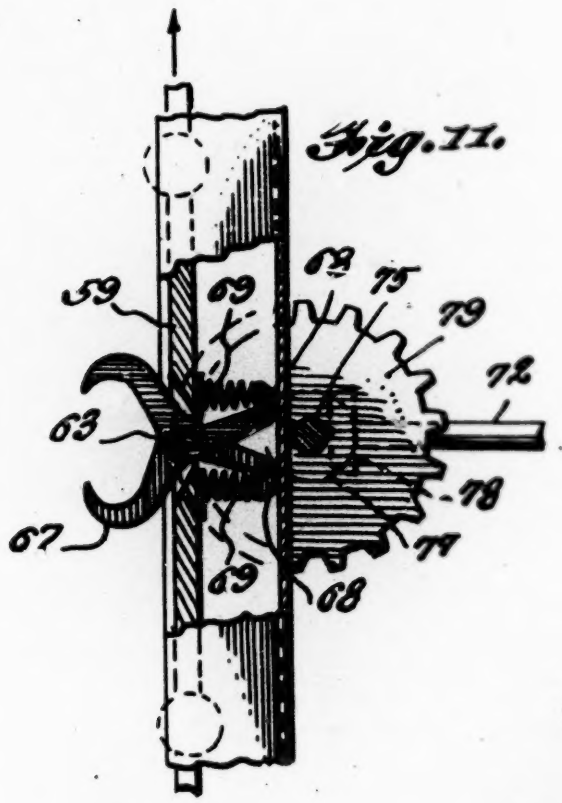


Fig. 12.

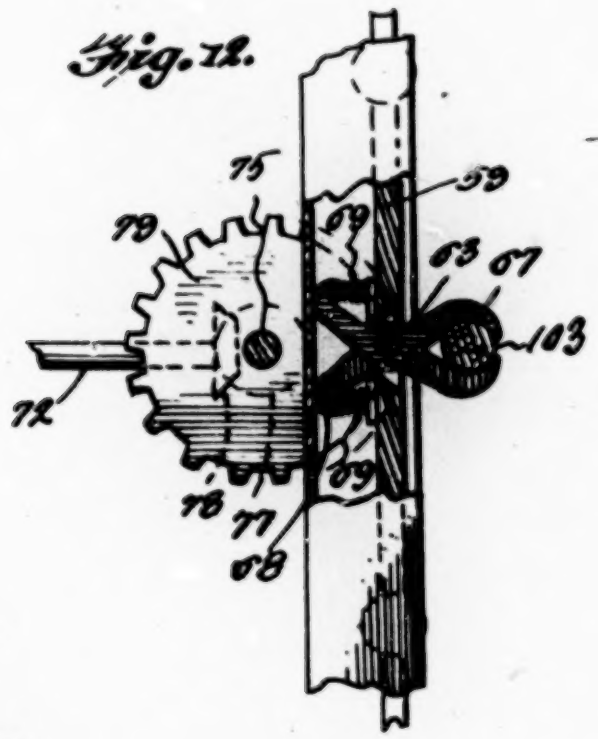


Fig. 13.

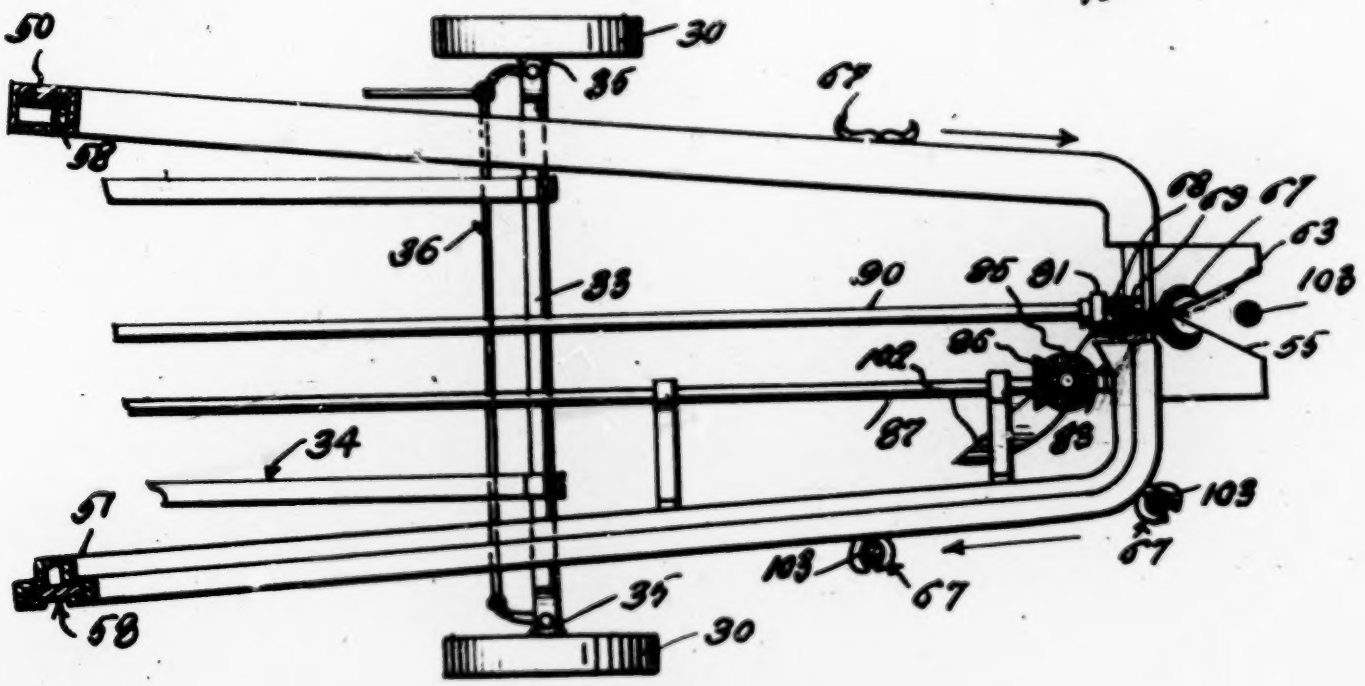


Fig. 14.

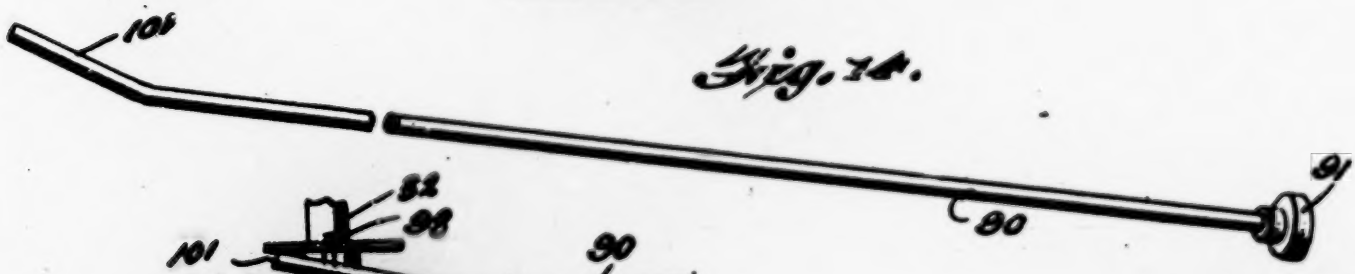
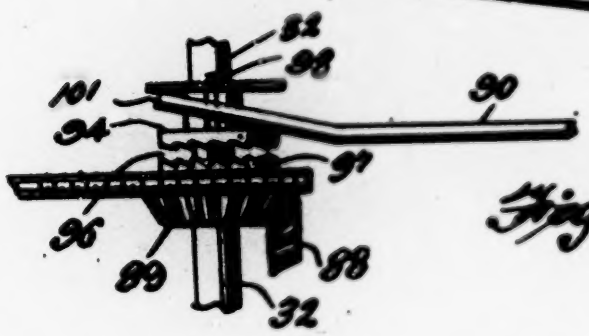


Fig. 15.



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HARVESTER WITH INTERMITTENTLY DRIVEN PLANT CUTTER AND CONVEYER

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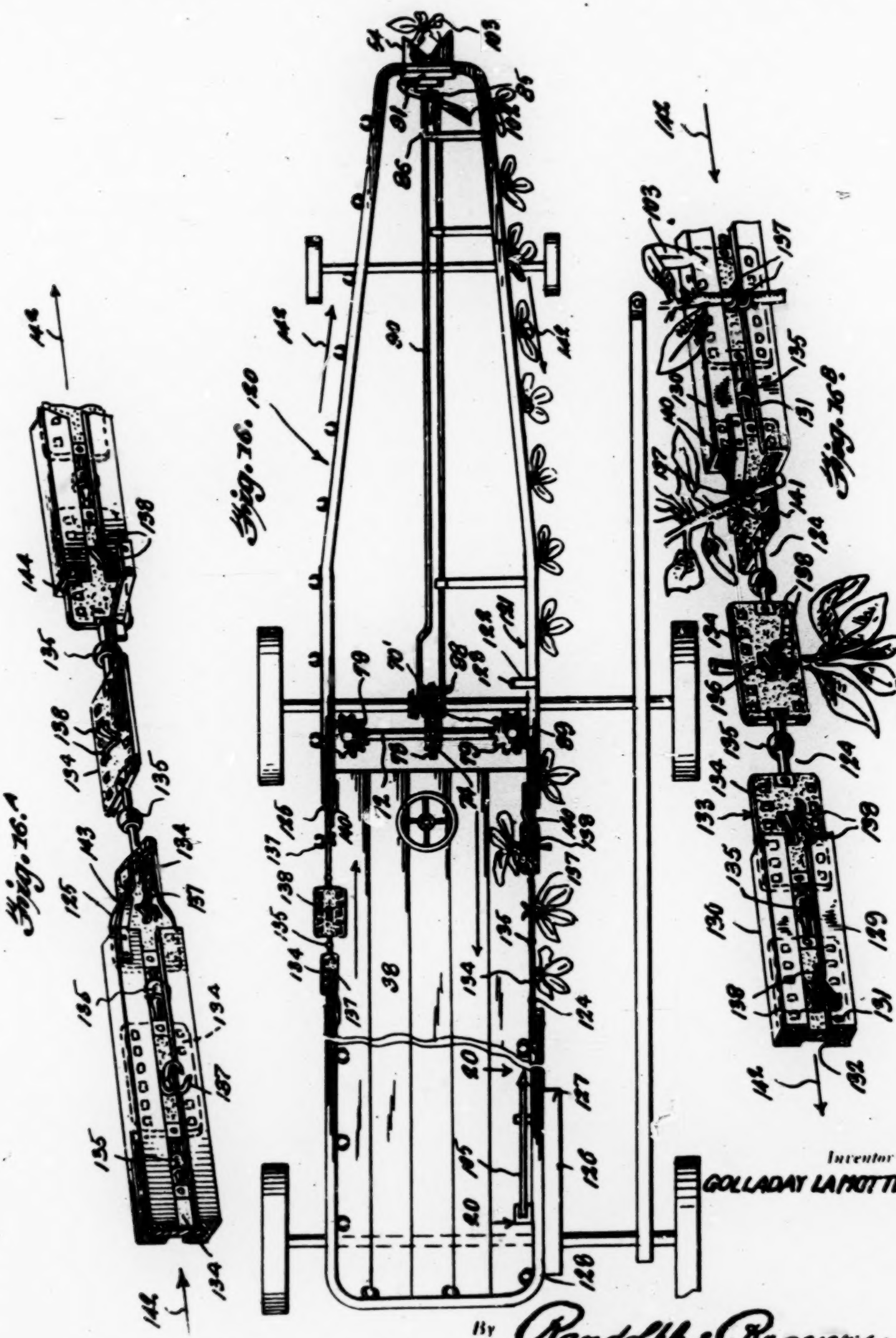

Fig. 16.

Fig. 16a.

Fig. 16b.

Fig. 16c.

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HARVESTER WITH INTERMITTENTLY DRIVEN PLANT CUTTER AND CONVEYER

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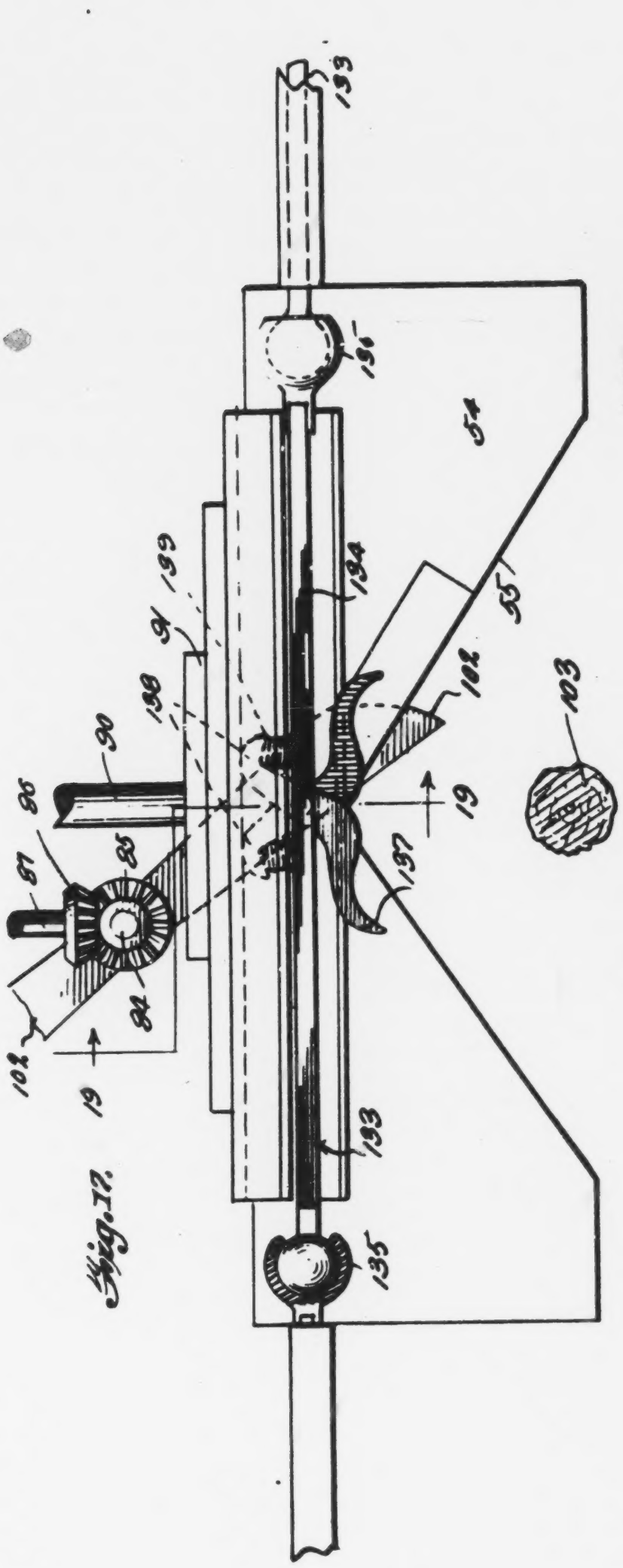

Fig. 17.

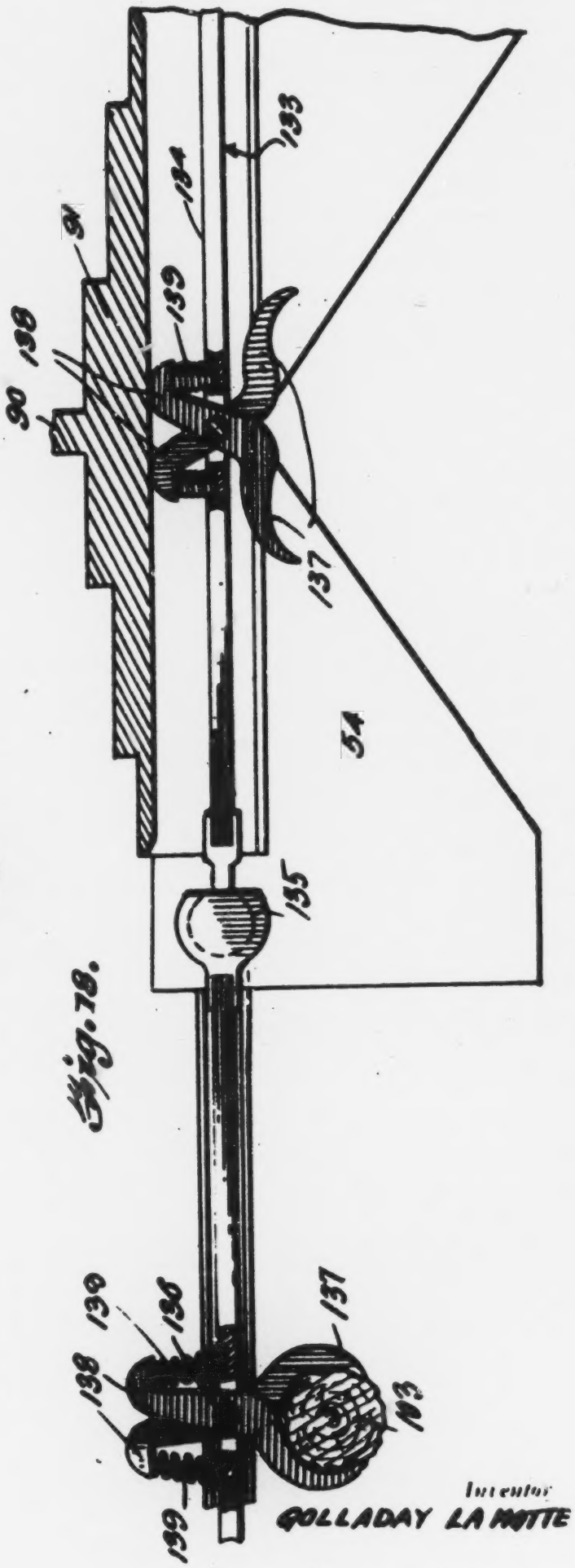

Fig. 18.

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July 26, 1949. G. LA MOTTE 2,477,068

HARVESTER WITH INTERMITTENTLY DRIVEN PLANT CUTTER AND CONVEYER

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Fig. 19.

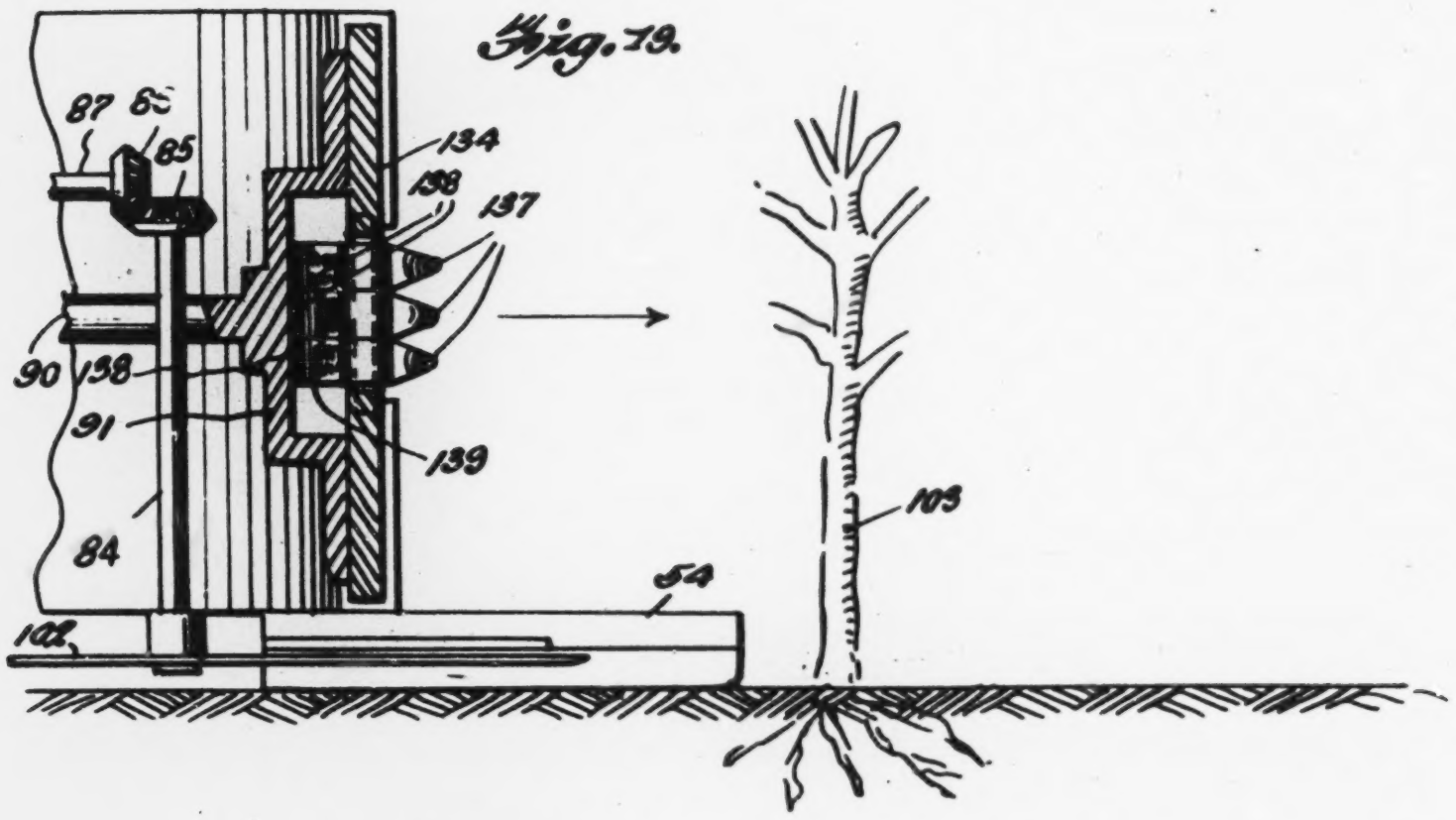


Fig. 20.

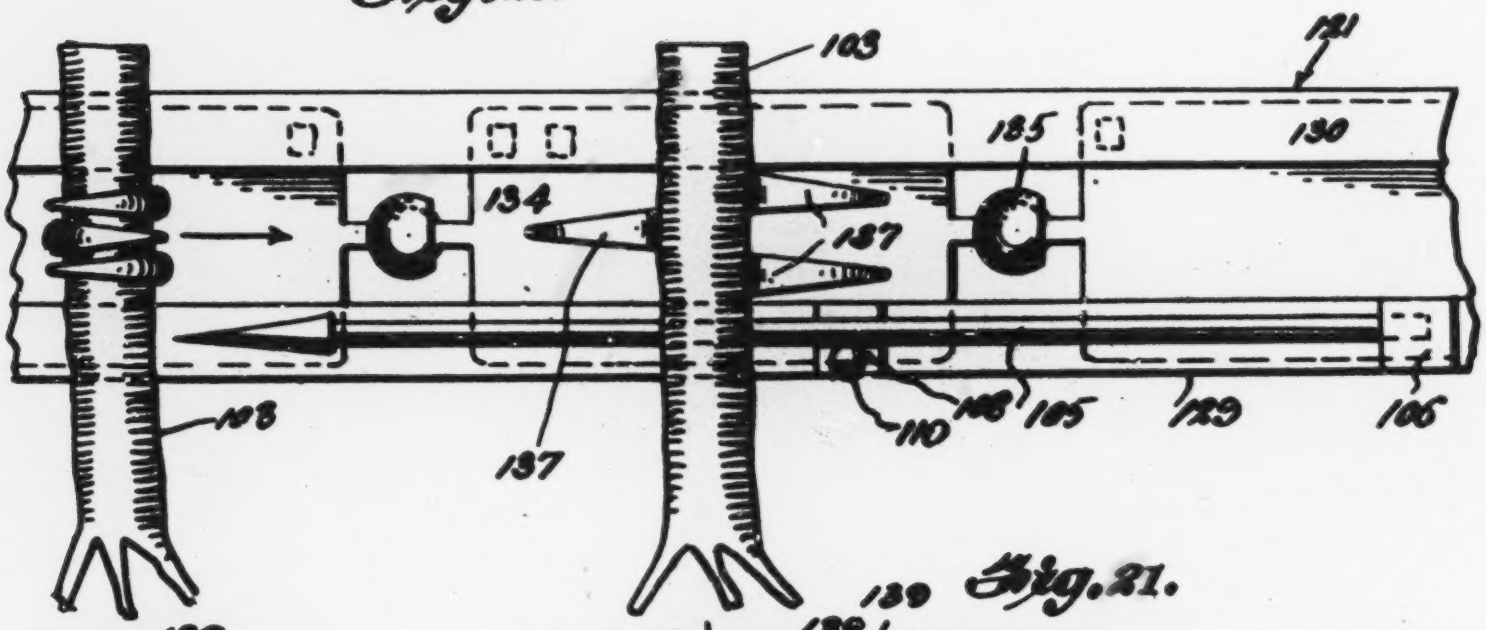
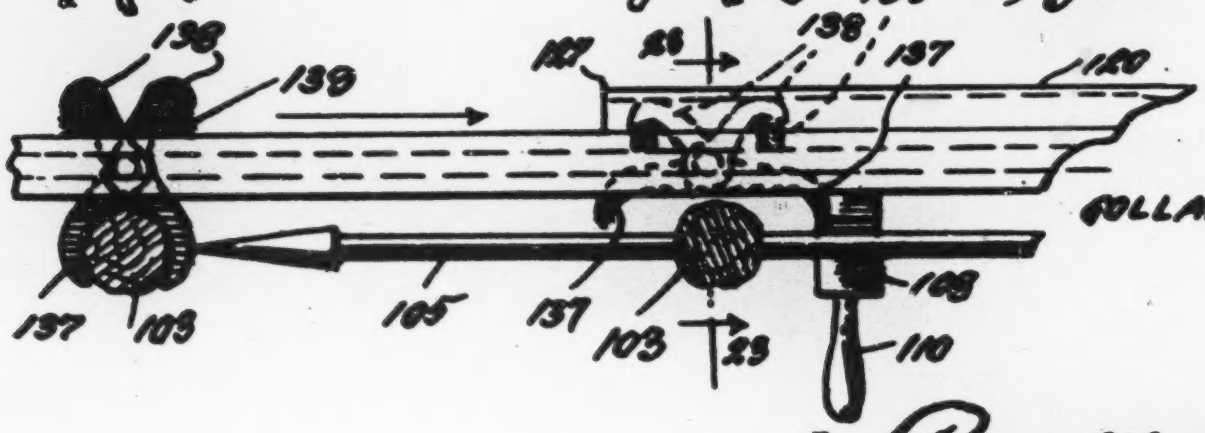


Fig. 21.



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HARVESTER WITH INTERMITTENTLY DRIVEN PLANT CUTTER AND CONVEYER

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Fig. 22.

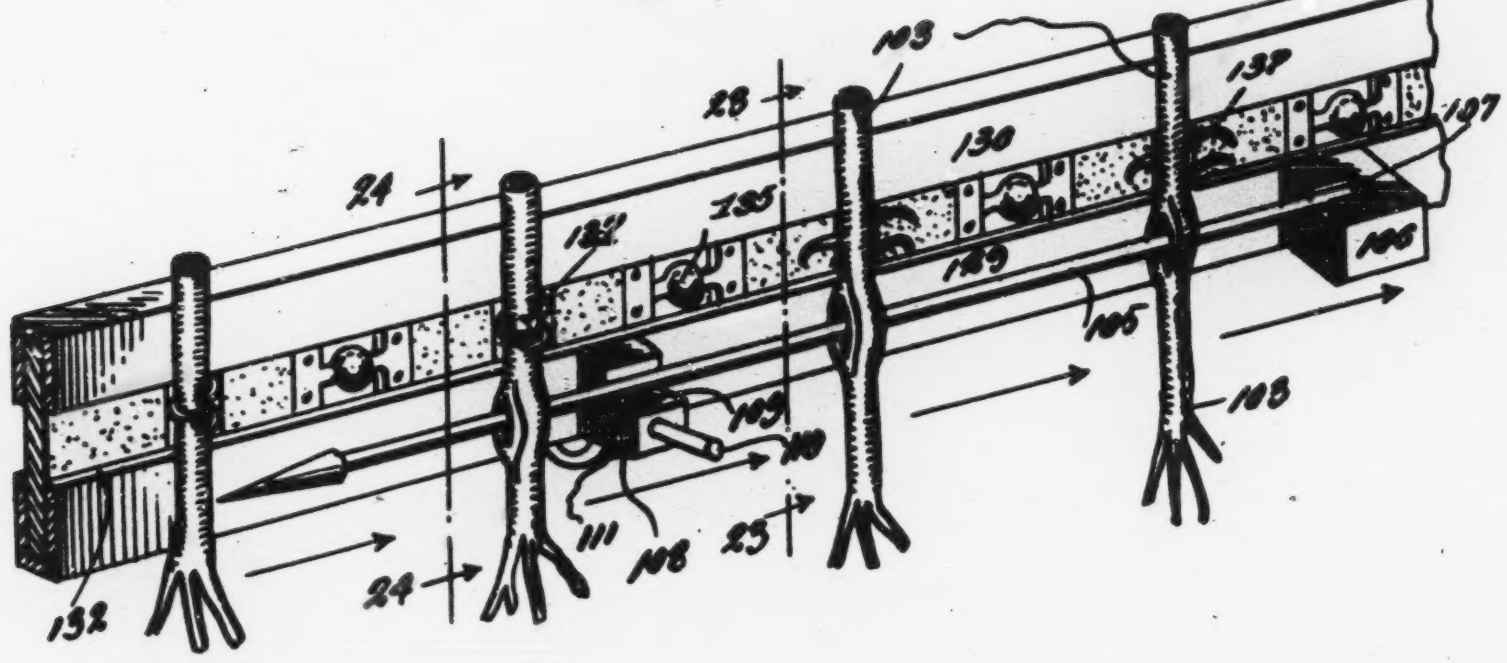


Fig. 23.

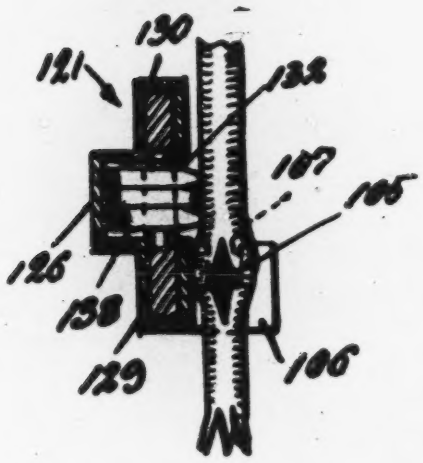


Fig. 24.

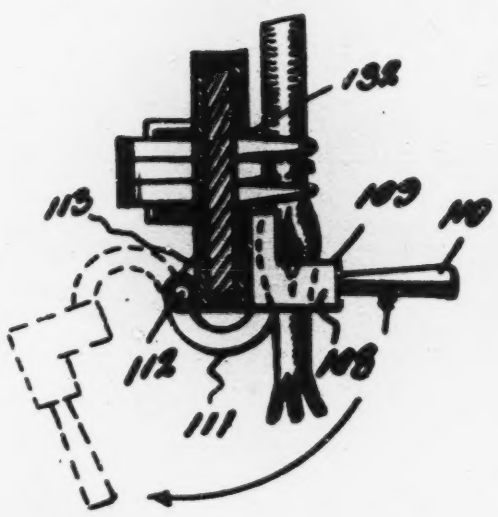
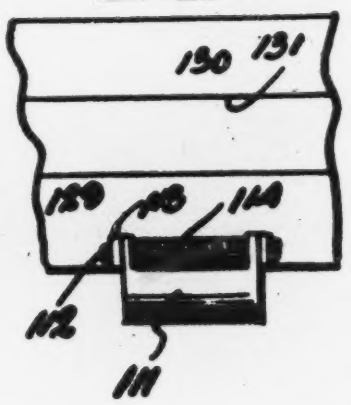


Fig. 25.



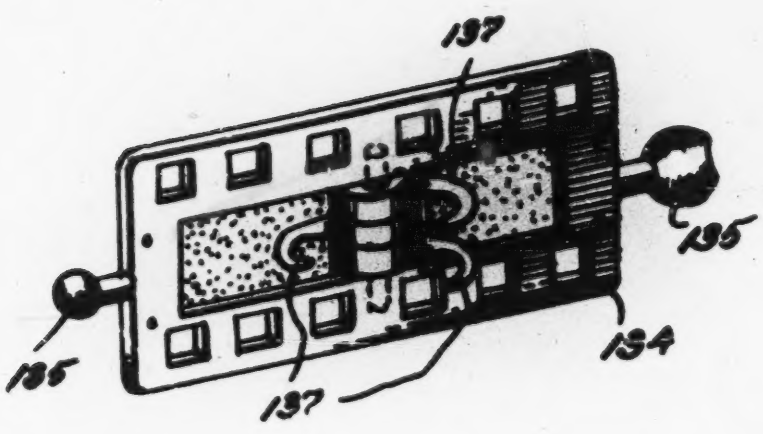


Fig. 26.

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Patented July 26, 1949 2,477,068

UNITED STATES PATENT OFFICE

2,477,068

HARVESTER WITH INTERMITTENTLY DRIVEN PLANT CUTTER AND CONVEYER

Golladay La Motte, Hopkinsville, Ky.

Application April 23, 1946, Serial No. 663,863

6 Claims. (Cl. 56—27.5)

1

This invention relates to a machine for harvesting plant-type crops and is especially intended and adapted for use in the harvesting of tobacco plants.

It is a primary object of the present invention to provide a machine which may either be self propelled or operated as a trailer attached to a tractor or other agricultural machine and which is adapted to be moved through a field of plant crops to be harvested and along a plant row for cutting off the individual plants, adjacent their roots and just above the ground, and for conveying the plants and applying them onto tobacco sticks.

A further object of the invention is to provide a harvesting machine having means for grasping the individual plants, for thereafter cutting the plants, and for subsequently conveying the plants away from the cutter means to enable the next plant still standing in the row being harvested, to be engaged and cut.

Still a further aim of the invention is to provide a machine which will be operated intermittently for cutting and conveying and having means whereby engagement of the plants, to be harvested, with the machine will actuate the operating means.

Still a further aim of the invention is to provide a machine having endless conveyor means by which the individual plants are inverted from the positions in which they are originally engaged and applied to plant supporting sticks, while thus inverted.

Still a further aim of the invention is to provide a conveyor having plant engaging means for grasping and releasing the harvested plants automatically.

Other objects and advantages of the invention will hereinafter become more fully apparent by the following description of the drawings, which illustrate a preferred embodiment thereof, and wherein:

Figure 1 is a top plan view of one form of the harvesting machine;

Figure 2 is a side elevational view thereof;

Figure 2^A is an enlarged fragmentary, side elevational view of a portion of the conveyor;

Figures 2^B, 2^C and 2^D are cross sectional views taken substantially along the plane of the lines 2^B—2^B, 2^C—2^C, and 2^D—2^D of Figure 2^A;

Figure 2^E is a top plan view of a portion of the conveyor;

Figure 3 is a longitudinal, substantially central sectional view of the machine;

Figure 3^A is an enlarged fragmentary side elevational view of a part of the conveyor portion shown in Figure 3;

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Figures 3^B, 3^C and 3^D are cross sectional views taken substantially along the plane of the lines 3^B—3^B, 3^C—3^C and 3^D—3^D of Figure 3^A;

Figure 3^E is a top plan view of the portion of the conveyor shown in Figure 3^A;

Figure 4 is an enlarged top plan view, partly in horizontal section, showing the forward end of the machine;

Figure 5 is a front elevational view thereof;

Figure 6 is a longitudinal sectional view taken substantially along the plane of the line 6—6 of Figure 4;

Figure 7 is a top plan view, partly in horizontal section, of a part of the intermediate portion of the machine;

Figures 8 and 9 are enlarged cross sectional views taken substantially along the planes of the lines 8—8 and 9—9, respectively, of Figure 7;

Figure 10 is a perspective view of a portion of the conveyor guide;

Figure 11 is a horizontal sectional view, partly in top plan, taken substantially along a plane as indicated by the line 11—11 of Figure 8;

Figure 12 is a view similar to Figure 11, taken substantially along the plane of the line 12—12 of Figure 9;

Figure 13 is a top plan view of the forward portion of the machine;

Figure 14 is a perspective view of a push rod;

Figure 15 is a plan view, on an enlarged scale, of the clutch;

Figure 16 is a top plan view of another embodiment of the machine;

Figure 16^A is an enlarged perspective view of a part of the return side of the conveyor;

Figure 16^B is a similar view of a part of the opposite side thereof;

Figure 17 is an enlarged plan view, partly in horizontal section, of the forward end of the machine;

Figure 18 is a view similar to Figure 17, showing additional parts in horizontal section;

Figure 19 is a vertical sectional view taken substantially along a plane as indicated by the line 19—19 of Figure 17;

Figure 20 is an enlarged side elevational view taken substantially along a plane as indicated by the line 20—20 of Figure 16;

Figure 21 is a fragmentary top plan view of certain of the parts shown in Figure 20;

Figure 22 is a perspective of the structure shown in Figure 20;

Figures 23 and 24 are cross sectional views

taken substantially along planes as indicated by the lines 23—23 and 24—24 of Figure 22;

Figure 25 is a fragmentary side elevational view, looking in the opposite direction to Figure 20; and

Figure 26 is a perspective view of one section of the endless conveyor.

Referring more particularly to the drawings and particularly to Figures 1 to 15, inclusive, and to Figures 20 to 26 inclusive, wherein one embodiment of the plant harvesting machine designated generally 27 is illustrated, said machine is preferably supported for movement through a field by three sets of ground engaging wheels 28, 29 and 30. Each of the sets of wheels includes a pair of wheels supported on the ends of an axle, said axles being designated 31, 32 and 33, respectively. The axles are mounted on the frame 34 of the machine 27; the rear axle 31 being either fixed or journaled therein, the intermediate axle 32 being journaled therein and with its wheels 29 keyed to the ends thereof, and the front axle 33 being fixed thereto and with its wheels 30 rotatably mounted on the ends thereof.

As best illustrated in Figures 1 and 12, the front axle 33 is provided with stub-axles 35, at the ends thereof, on which the wheels 30 are journaled. A conventional vehicle steering mechanism 36 is connected to the stub-axles 35 and to the steering post of a steering wheel 37, as seen in Figure 1. The frame 34 is provided with a floor or platform 38 for supporting an operator, not shown, who stands thereon in a position to steer the machine 27 by means of the steering wheel 37.

As best seen in Figures 2 and 3, the frame 34 is provided with a plurality of supporting uprights or posts 39 which support the intermediate and rear portion of an endless conveyor guide, designated generally 40. The conveyor guide 40 extends from end to end of the machine 27 and has corresponding side portions which converge toward the forward end thereof, as best seen in Figure 1. Said corresponding side portions, designated 41 and 42 are downwardly and forwardly inclined adjacent their forward ends, as seen at 43 and 44, respectively, as best illustrated in Figures 2 and 3, to position the forward end 45 of the conveyor guide 40 in downwardly off-set relationship to the rear end thereof. The forward part of the conveyor guide 40 is supported by longitudinal beams 46, forming a part of the frame 34 and also by posts 47 which are secured to the front axle 33.

As best illustrated in Figures 2, 2A and 2B, the conveyor guide portion 41, between the front and rear uprights 39, is provided with a gradual 180 degree twist portion 48; and as seen in Figures 3, 3A and 3B, the guide portion 42 is provided with a similarly located and similarly twisted portion 49, for a purpose which will hereinafter be described.

Referring to Figures 2, 2A and 2B, it will be readily apparent that the guide portion 41 constitutes a substantially closed conduit, as seen in Figures 2B, 2C and 2D, except for a longitudinally extending slot 15 in one side thereof. The opposite side of the conduit forming the guide 40 is provided with a continuous, longitudinally disposed and inwardly opening channel 51. From the forward end 45 of the guide to the beginning of the twisted portion 48, the guide portions 41 and 42 are disposed with the slot 50 thereof, arranged to open laterally and outwardly of the machine 27, and the channel 51 is disposed on

the inner side thereof. Beyond the twisted portion 48, across the rear guide portion 52 and back to the twisted portion 49 on the opposite side, the slot 50 is arranged to open inwardly. As seen in Figures 3 and 3A the twist 49 in the side 42 of the guide again turns said guide so that therebeyond and to the forward end of the machine 27, the conveyor guide 40 is located with the slot 50 facing outwardly.

Particularly in Figures 4 and 5, the forward portion 45 of the conveyor guide is provided with a gap 53 between spaced portions of the guide conduit which are bridged or connected by a horizontally disposed plate 54 which is located adjacent to the ground level and beneath and against the underside of the guide portion 45. The plate 54 is provided with a forwardly opening, substantially V-shaped recess or notch 55 for a purpose which will hereinafter become apparent. A pair of longitudinally disposed skids or runners 56 depend from the plate 54, adjacent the ends thereof, and are arranged to support the forward end 45 by engagement with the ground, indicated by the numeral 57 in Figure 5, in the event that the machine 27 is tilted downwardly at its front end or in passing over raised portions in the surface of the ground.

As illustrated in Figures 4, 5 and 6, the conveyor guide 40 contains an endless conveyor, designated generally 58 and which is composed of a plurality of flexible plates or strips 59 which are connected together in spaced apart, end to end relationship by universal ball and socket joints 60. As best seen in Figure 6, the plates 59 are of a width slightly less than that of the conveyor guide 40 and of a thickness substantially less than that of the guide to permit individual plates 59, forming the endless conveyor 58, to slide freely in the several portions of the conveyor guide 40.

Each of the plates 59 is provided with a series of longitudinally disposed, longitudinally spaced openings 61 adjacent each longitudinal edge thereof and with a central opening 62 through which a pivot pin 63 extends. Each of the plates 59 is so equipped with a pivot pin 63, arranged transversely thereof, and each pivot pin 63 provides a pivotal support for three fingers 64, 65 and 66 which are arranged in superimposed relationship. Said fingers are pivotally connected intermediate of their ends and are provided with outwardly projecting claw portions 67 which are bowed longitudinally. The claw portions 67 of the top and bottom fingers 64 and 66 project in one direction and the claw of the intermediate finger 65 projects in the opposite direction. The opposite ends or lever portions 68 of the fingers 64, 65 and 66 are curved so as to extend in the same general direction as the complementary claws 67, so that said fingers actually do not cross but merely overlap for a portion of their length. An expansion coil spring 69 is disposed between the outer end of each lever 68 and the rear face of the complementary plate 59 for urging the lever portions 68 to swing toward one another, thereby urging the claws 67 toward one another and into closed relationship, as best illustrated in Figure 12. From the foregoing it will thus be readily apparent that the spring 69 urges the lever end 68 away from the plates 59 thereby urging the claws 67 to closed position.

Referring particularly to Figures 7 and 8, the shaft or axle 32 which is keyed to the ground wheels 29 and journaled in the frame 34 has a sprocket wheel 70 rotatably mounted thereon. A clutch, designated generally 71, which will here-

inafter be described in detail, is splined on shaft 32, and is movable into and out of engagement with the sprocket wheel 78 to cause the sprocket wheel 78 to be rotated by the axle 32 or to permit the axle 32 to revolve relatively to the sprocket wheel. A transversely disposed shaft 72 is journaled in the frame 34 behind the axle 32 and has a sprocket wheel 73 keyed thereto. An endless chain 74 is trained over the sprocket wheels 78 and 73 for driving the shaft 72 from the axle 32 when the clutch 71 is in an operative position. A pair of vertically disposed shafts 75 are journaled in bearings 76 which are secured to and project upwardly from the forward pair of supporting posts 39. The shafts 75 have bevel gears 77 keyed to their lower ends and the shaft 72 has two bevel gears 78 keyed thereto, one of which meshes with each of the bevel gears 77 for driving the shafts 75 from the shaft 72. Each of the shafts 75 is provided with a pair of sprocket wheels 79 which are keyed thereto and disposed adjacent the upper end thereof and in vertically spaced apart relationship. The sprocket wheels 79 project through slots 80 in the inner wall of the conveyor guide 40 into the interior thereof, and the teeth of said sprocket wheels 79 are arranged to engage in the rows of openings 61 of the plates 59 so that said openings and the plates will function as an endless belt which is driven by the sprocket wheels 79.

As best seen in Figure 1, a pair of vertically disposed shafts 81 are journaled in the frame 34, adjacent the rear corners thereof, and are each provided with a pair of sprocket wheels 82 keyed thereto in the same manner as the sprocket wheels 79 are keyed to the shafts 75. The sprocket wheels 82 are preferably idler sprocket wheels and function to assist the plates 59 in passing around the rear corners of the conveyor guide 40; however, sprocket wheels 82 may, if desired, be driven through a suitable connection with the shafts 75.

Referring particularly to Figures 4, 6 and 13, a bearing 83 projects rearwardly from the forward, transverse portion 45 of the conveyor guide to provide a journal for a vertically disposed shaft 84 which has a bevel gear 85 keyed to the upper end thereof and meshing with a bevel gear 86 which is keyed to the forward end of a longitudinally disposed shaft 87. The shaft 87 is journaled in transversely disposed members forming a part of the frame 34 and is provided at its rear end with a bevel gear 88, as best seen in Figure 1, which meshes with a bevel gear 89 which is secured to or forms a part of the sprocket 70.

A push rod 90 is reciprocally mounted by the frame 34 for longitudinal movement relatively thereto and is provided at its forward end with a head or plate 91 which is normally disposed to engage the lever ends 68 of the fingers which are located intermediate of the ends of the plate 54. As seen in Figure 7, an expansion spring 92 is carried by the rod 90 and has one end thereof seated against a transverse bar of the frame 34, in which the rod 90 is reciprocally disposed. The opposite end of the spring 92 abuts against a collar 93 carried by the rod 90 for urging said rod forwardly to move the head 91 into engagement with the lever end 68, previously referred to.

Referring particularly to Figure 15, the clutch 71 includes a clutch disk 94 having a toothed face 95 for interengagement with the similarly shaped toothed face 96 on a clutch member 97 which is fixed to the sprocket wheel 70 on the opposite side thereof to the bevel gear 89. The axle 32 is provided with an elongated slot 98 in which a key 99 is slidably disposed. The key 99 is connected at one end thereof to the clutch disk 94 and is connected at its opposite end to a disk or plate 100. The key 99 functions to key the disk 94 and plate 100 to the axle 32 and to connect the parts 94 and 100 in spaced apart relationship. The push rod 90 is provided with an oblique portion 101 at its rear end which projects through the space between the parts 94 and 100. When the push rod 90 is moved forwardly by the spring 92, the oblique end 101 acts as a cam for engagement with the plate 100 for moving the clutch disk 94 out of engagement with the clutch member 97. When the push rod 90 is moved rearwardly the oblique portion 101 is disengaged from the plate 100 and immediately thereafter the opposite side of the oblique portion 101 moves into engagement with the disk 94 to return said disk into operative engagement with the clutch member 97, by means which will hereinafter be described.

As best illustrated in Figure 6, a rotary cutting knife 102 is provided with a hub portion which is keyed to the lower end of the shaft 84. Knife 102 is provided with two or more radially projecting cutting blades which are disposed to operate just below the plate 54 for cutting off growing plants, indicated 103 near their roots and just above the ground level 57.

As seen in Figure 1, from in front of the shaft 84 along the conveyor guide portions 43 and 41, the channel 51 is relatively shallow to just beyond the twist 48 therein where, at the point 104 the channel is increased in depth and is of this increased depth back to the gap 53 in the forward portion 45.

Contiguous with the beginning of the increased depth of the channel 51 at 104, the guide 40 is provided with a stick 105 upon which the plants 103 are collected, as will hereinafter be explained. The stick 105 and its method of mounting is fully illustrated in Figures 20 to 25, wherein a modified form of the machine is shown, but in which the construction of the stick 105 and its method of mounting is exactly the same as in the machine 27. Referring to these figures, a bracket 106 is secured to and projects inwardly from the guide 40 and is provided in its upper face with a notch 107 which opens upwardly and forwardly of the bracket 106. A pivotally mounted bracket 108 is mounted on the guide 40 and projects inwardly therefrom and is provided with an upwardly and inwardly opening recess 109 and an inwardly extending handle 110. As best illustrated in Figure 24, the bracket 108 is provided with a downwardly bowed arm 111 which is pivotally connected at 112 to a lug 113 which projects from the outer side of the guide 40. The pivot 112 is provided with a spring 114, as seen in Figure 25 for normally retaining the bracket 108 in its full line position of Figure 24; however the handle 110 can be manually engaged for swinging the bracket 108 to its dotted line position of Figure 24 for releasing the stick 105 from engagement therewith. As best illustrated in Figure 23, the rear end of the stick 105 seats in the notch 107 and a portion thereof, adjacent its forward end, rests in the recess 109. The forward end of the stick 105 is provided with a tapered, spear-shaped point 115, for a purpose which will hereinafter become apparent.

The endless conveyor 58 is driven in a clockwise direction as seen in Figure 1, and as indicated by the arrows 116 by the driving means, previously described. The movement of the end-

less conveyor is intermittent as will now be described. Assuming that a plate 50 is located above the plate 54 and with the claw member thereof centrally disposed with respect to the notch 55 and in alignment with the push rod 90, as seen in Figure 4, the claw member thus disposed will have its lever end 68 held extended with respect to the plate 50 so that the claws 67 will be opened. As the machine 27 moves forward along a row of growing plants, a stalk from a plant 103 will enter the open jaws 67 and will exert a rearward pressure thereby against the push rod 90, and at the same time, will cause the jaws 67 to close around the plant stalk 103. The rearward movement thus imparted to the push rod 90 will cause the rear end thereof to move the clutch disk 94 into operative engagement with the clutch portion 97, as previously described. This will cause the sprocket wheels 76 and the bevel gear 80 to revolve with the axle 32. The rotation of the bevel gear 80 will rotate shafts 87 and 84 to revolve the knife 102 to cut off the stalk of the plant 103 below the level of the plate 54. The rotation of the sprocket wheel 76 will be imparted to the sprocket wheel 73, shaft 72, shafts 75 and sprocket wheels 79 to move the endless conveyor 58 in a clockwise direction. This movement of the endless conveyor will cause the claws 67, grasping the aforementioned plant 103 to move toward the aforereferred to shallow channel portion 51. The lever 68 will engage the entrance end of the shallow channel portion 51 immediately upon moving out of engagement with the plunger head 91 and will be urged inwardly thereby toward the plate 59 for holding the jaws 67 closed around the plant stalk. When the lever ends 68 move out of engagement with the push rod head 91, the push rod spring 92 will urge the push rod forwardly to thereby cause the oblique end 101 to disengage the clutch 71, in the manner previously described in reference to the detailed description of Figure 15. Upon disengagement of the clutch 71 the parts driven by the sprocket 76 and bevel gear 80 will cease to operate thereby stopping movement of the endless conveyor 58 and the knife 102. During this operation, the endless conveyor 58 will have moved a distance equal to the distance between the centers of any two adjacent conveyor plates 59, to thereby position another set of fingers in front of the plunger rod head 91, so that the operation can be repeated when the claws 67 thereof are engaged by the next plant stalk in the row, along which the machine is operating. The claws 67 engaging the cut plant stalks are held closed during the intermittent movement thereof along the conveyor guide portion 43 and 41. Upon traversing the twisted portion 49 the endless conveyor 58 is turned on its longitudinal axis through an arc of 180 degrees, as seen in Figure 1 to position the plates on the inner side of the conveyor guide 40. This rotation of the individual conveyor plates 59 is provided for by the universal joint connection 66. Almost immediately after passing beyond the twisted portion 49, the plant stalk comes in contact with and is pierced by the pointed end of the stick 105, as clearly illustrated in Figures 20 to 25, and is thereafter moved along the shank of the stick until the lever end 68 of the fingers engaging the plant enter the deep portion of channel 51 at 104. When this occurs, the springs 69 will force the lever ends 68 away from its supporting plate 59 thereby causing the claws 67 to open and disengage the plant stalk. Thereafter and for the remainder of the movement of the conveyor plate 59 around the rear portion 52 and along the side portions 42 and 44 and back to the front portion 45 of the conveyor guide 40, the channel 51 is preferably made deep so that the claws 67 may remain open. However, if desired, the channel portion 51 could be again made shallow a reasonable distance beyond the point 104 and after the plants, engaged by the stick 105 have been passed. In traversing the twisted portion 49 of the conveyor guide 40, the conveyor plates 59 are again rotated through an arc of 180 degrees to position the claws 67 in an outwardly extending position ready to again move into position in front of the push rod 90. In addition to the operator, previously referred to, who steers the machine 27, a second operator works in a position adjacent to the stick 105; his duties include moving the bracket 106 from its full line to its dotted line position of Figure 24, when required, to stack the plants 103, one against the other on the shank of the stick 105, and said operator also removes the stick 105, when filled, and replaces it with another stick. The filled stick 105 may be placed in a vehicle, not shown, drawn behind the machine 27 on may be laid upon the ground at the side of the machine.

In Figures 16 to 26 inclusive, another, slightly modified embodiment of the invention is disclosed and which comprises a machine designated generally 120. The frame, location of the wheels and axles, steering means, endless conveyor driving means, plant cutting means and clutch means of the machine 120 are of the same construction as in the machine 27 and therefore will not be described again.

The machine 120, as seen in Figure 16, includes a conveyor guide, designated generally 121 which is supported at a plurality of points throughout its length by means of laterally projecting brackets 122 on supporting posts 123 which rise from the frame or floor of the machine 120. Conveyor guide 121 is similar in shape to the conveyor guide 40 and is similarly disposed with respect to the machine 120, but differs from the conveyor guide 40 in that the twisted portions are dispensed with and, in lieu thereof, the guide 121 is provided with gaps 124 and 125 located in substantially the same positions as the twisted portions 48 and 49, respectively. Also, as best illustrated in Figures 16^A, 16^B, 23 and 24 the cross sectional construction of the conveyor guide 121 differs from that of the conveyor guide 40. The conveyor guide 121 supports a stick 105 in the same location that the stick 105 is supported on the conveyor guide 40 and in exactly the same manner, as previously described and as illustrated in Figures 20 to 25. Contiguous with the location of the stick 105, the conveyor guide 121 is provided with an outwardly extending longitudinally disposed channel portion 126 having an open, flared forward end 127 and a closed inwardly curved rear end 128. The remainder of the conveyor guide 121 is composed of an upwardly opening, substantially U-shaped channel member 129 and a downwardly opening, similarly shaped channel member 130, which is disposed directly thereabove and which is vertically spaced therefrom to combine therewith to form laterally opening outer and inner slots 131 and 132, respectively.

The endless conveyor, designated generally 133, which is slidably disposed in the guide 121 is composed of a plurality of elongated plates 134, of the

same construction as the plates 59 and which are connected together in the same manner by universal ball and socket joints 135. Each of the plates 134 pivotally support a set of pivotally mounted fingers, designated generally 136, each of which includes three superimposed fingers. Fingers 136 differ from the fingers 64, 65 and 66 in that the intermediate portion of the central finger is disposed in crossed relationship to the upper and lower fingers. The claw or plant engaging portion 137 of each set of fingers 136 are similarly disposed and of substantially the same shape as the claws 67. The opposite lever ends 138 of each set of fingers 136, as best illustrated in Figure 18, are also similarly shaped to the lever end 68 and are provided with springs 139, arranged in the same manner as the spring 69, for urging the lever end 138 away from the conveyor plates 134. However, in view of the crossed relationship of the intermediate and the upper and lower fingers, the springs 139 constantly function to urge the jaws 137 into closed position.

As best seen in Figures 16A and 16B, a spring member, in the form of an elongated leaf or strip 140 is secured to the upper channel member 130 at one end thereof and is located so that its opposite, free end projects into the entrance end of the gap 124 and said free end 141 is twisted and arranged to engage each plate 134 as it enters the gap 124, moving in the direction, as indicated by the arrows 142. Looking in the direction of the arrows 142, the spring portion 141 causes each plate 134 as it enters the gap 124 to be rotated through an arc of substantially 90 degrees in a clockwise direction. The conveyor plates 134, at the time of entering the gap 124, are each conveying a plant 103, the weight of the upper end of which will cause such plate to turn in a further arc of 90 degrees on its swivel 135, so that the plate upon re-entering the channel 121 from the gap 124 will be inverted from the position in which it left the channel 121.

At the opposite side of the machine 120, the conveyor strips 134 as they leave the conveyor guide 121 and enter the gap 125, in the direction as indicated by the arrows 142 in Figure 16A, are turned on their longitudinal axis in a counter-clockwise direction, looking in the direction of the arrows 142, by a deflector member 143. The deflector member 143 is similar in shape to the member 140 and is similarly mounted on the conduit 121 and disposed in the entrance end of the gap 125. However, the deflector 143 is arranged to rotate the plates 134 through an arc slightly in excess of 90 degrees. At the opposite, exit end of the gap 125, a similar deflector 144 is provided. Deflector 144 engages under the strips 134 as they approach the exit end of the gap 125 and rotates them further in a counter-clockwise direction to again position them in a vertical plane for re-entrance into the conduit 121.

From the foregoing it will be readily apparent that the claws 137 project outwardly through the slot 131 during the movement of the conveyor strips 134 from the gap 125 around to the gap 124 and at the same time the lever ends 178 project inwardly through the slot 132 and travel therein. Throughout the cycle of movement of the sets of fingers 136, the claws 137 thereof are held closed by the action of the springs 139 on the lever end 138, except during their movement through the channel portion 126. When the lever ends are in engagement with the channel portion 126, said ends are forced inwardly to thereby open the claws 137 to release a plant, carried by the claws, and which plants have been all ready pierced by and are engaged upon the stick 106 as previously described in reference to the machine 27, and as clearly illustrated in Figures 20 to 25. After the lever end 138 moves out of the exit end 126 of the channel 126, the claws 137 resume their closed position and remain thus until in place above the guard plate 54 and the cutting knife 102. However, in assuming this position, the lever ends 138 are cammed inwardly by engagement with the push rod head 91, sufficiently to open the jaws 137 enough to receive the stalk of a plant 103. The pressure exerted against the push rod head 91 by the fingers 136 when the claws 137 are engaged by a plant stalk which is received therein, will cause the push rod spring 92 to yield allowing the push rod 86 to slide rearwardly and actuate the clutch 71, in the manner heretofore described in reference to the machine 27. The subsequent operation of cutting the engaged plant stalks and moving the conveyor to position the next empty claw 137, in place to receive the next plant, in the same manner and by the same means as previously described in respect to machine 27.

From the foregoing description it will be readily apparent that the conveyor strips 134 will be intermittently moved in the direction of the arrows 142 and upon entering the gap 124 will be turned clockwise 180 degrees, as previously described, so that the plant stalk can be pierced by and engaged on the stick 106. Thereafter the claws are opened by the channel 126 for disengaging the claws therefrom and, after leaving the channel end 128, said claws will resume their normal, closed position. Upon passing through the gap 125, the plates 134 are again rotated 180 degrees to position the claws, preparatory to receiving the next plant stalk, as previously described.

Various other modifications and changes are contemplated and may obviously be resorted to without departing from the spirit and scope of the invention as hereinafter defined by the appended claims.

I claim:

1. A plant harvester comprising a mobile frame for movement through a field of standing plant crops, a driven endless conveyor, guide means supported by the mobile frame and in which the endless conveyor is movably mounted, said guide means extending along both sides and across both ends of the frame, a plurality of claw members carried by the endless conveyor for engaging standing plants to be harvested, and means disposed in said guide means for closing and opening the claw members for causing the claw members to engage and release, respectively, the plants.

2. A plant harvester as in claim 1, a driving means for said endless conveyor mounted on the frame, a clutch for said driving means, and a clutch actuator having a portion disposed adjacent the position at which the claws are opened for receiving the plants, said actuator portion being engaged by each claw as the claw is engaged by a plant for moving the clutch actuator to a position to engage the clutch for intermittently driving the endless conveyor.

3. A plant harvester as in claim 1, a driving means for said endless conveyor mounted on the frame, a clutch for said driving means, a clutch actuator having a portion disposed adjacent the position at which the claws are opened for receiving the plants, said actuator portion being

engaged by each claw as the claw is engaged by a plant for moving the clutch actuator to a position to engage the clutch for intermittently driving the endless conveyor, and rotary cutting means driven by said driving means and supported on the frame adjacent the position at which the standing plants are engaged by the open claws for severing the plant stalks below the endless conveyor and while engaged by the claws.

4. A plant harvester as in claim 1, a channel member forming a part of the endless conveyor guide means and having portions for engaging and opening the claws to release the plants therefrom.

5. A plant harvester as in claim 1, said guide means including a channel member having spaced portions opening outwardly of the frame and a portion opening inwardly of the frame and connected to the outwardly opening channel portions by twisted channel portions, said claws projecting from the endless conveyor outwardly through the opening of the channel member and

being displaceable by the twisted portions thereof to displace the plants carried thereby from the outer side of the frame to the interior thereof.

6. A plant harvester as in claim 1, said endless conveyor including a plurality of flexible conveyor sections disposed in spaced end-to-end relationship, and universal joints connecting said conveyor sections.

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Aug. 14, 1951 C. L. SOWERS 2,564,614

HARVESTING MACHINE FOR TOBACCO PLANTS AND THE LIKE

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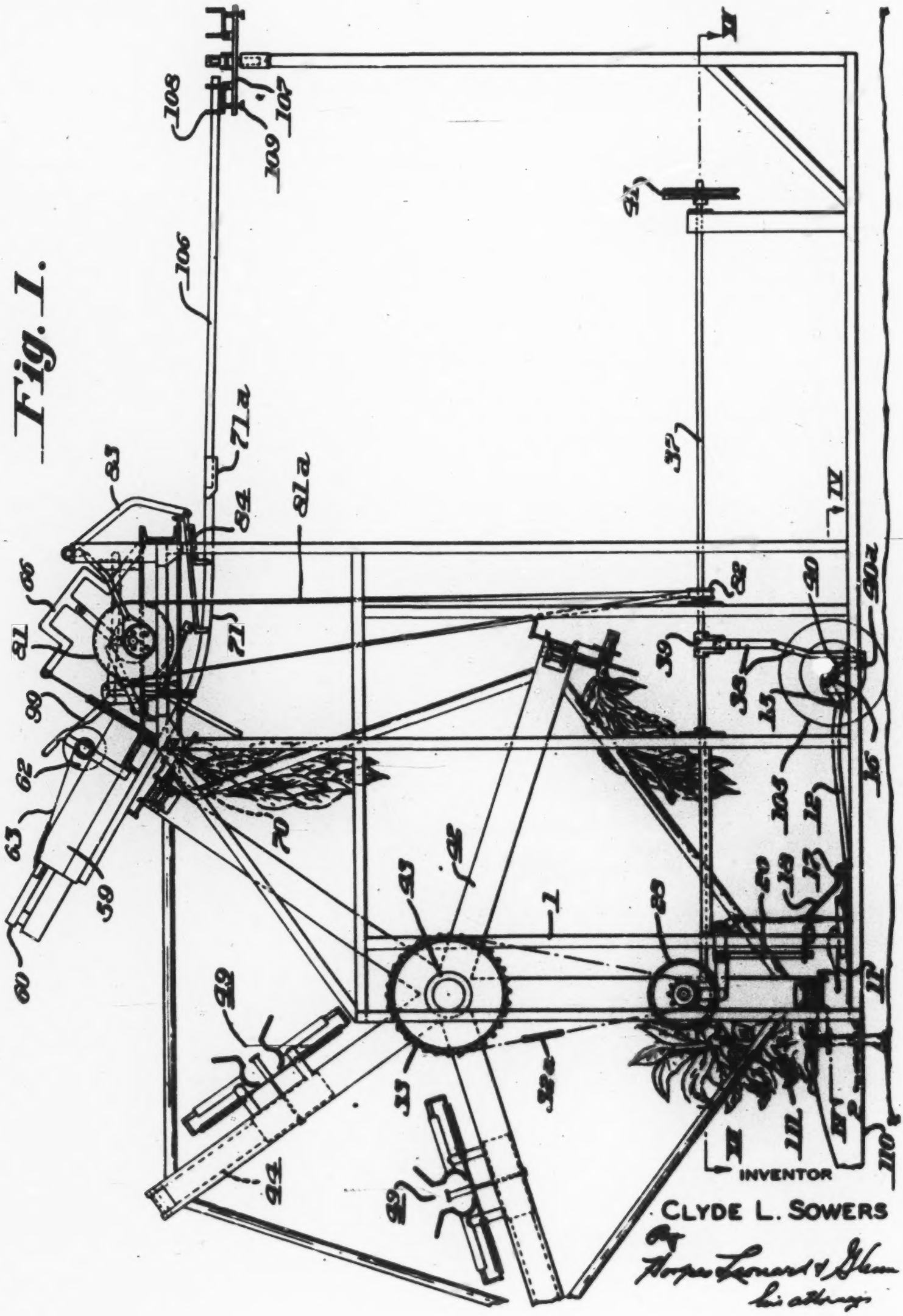
Fig. 1.



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HARVESTING MACHINE FOR TOBACCO PLANTS AND THE LIKE

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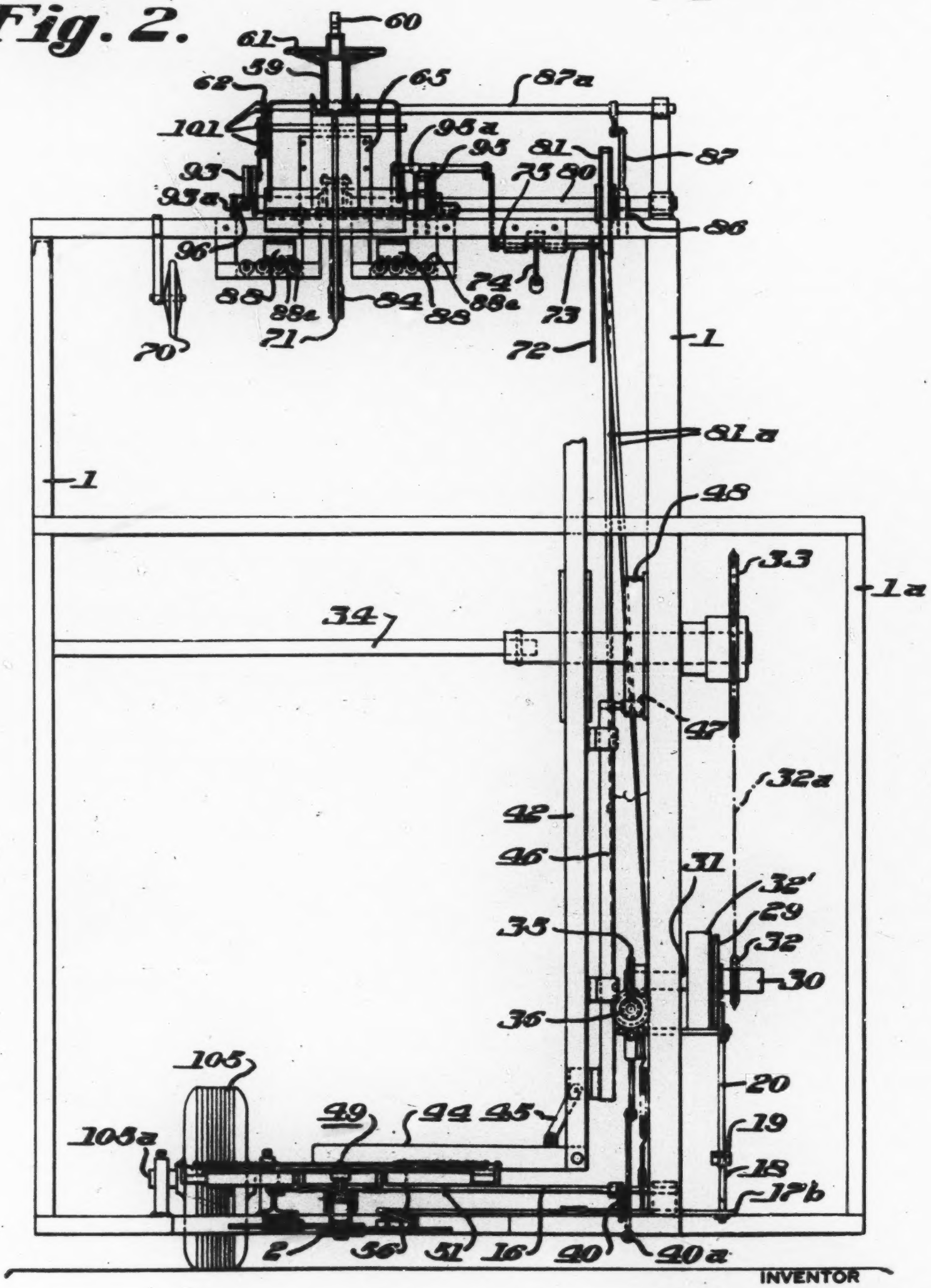
Fig. 2.



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HARVESTING MACHINE FOR TOBACCO PLANTS AND THE LIKE

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Fig. 3.

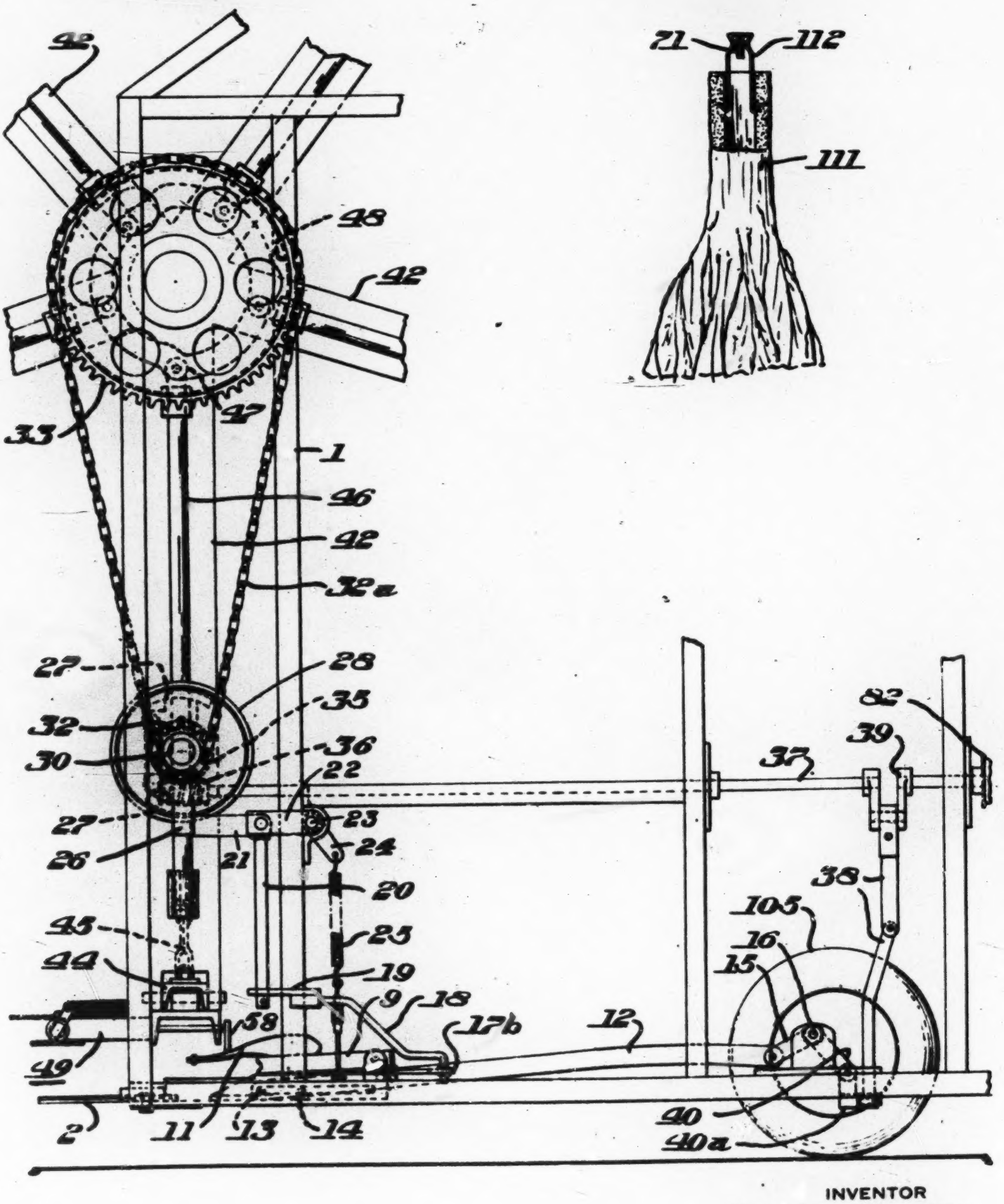

Fig. 11.

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Fig. 4.

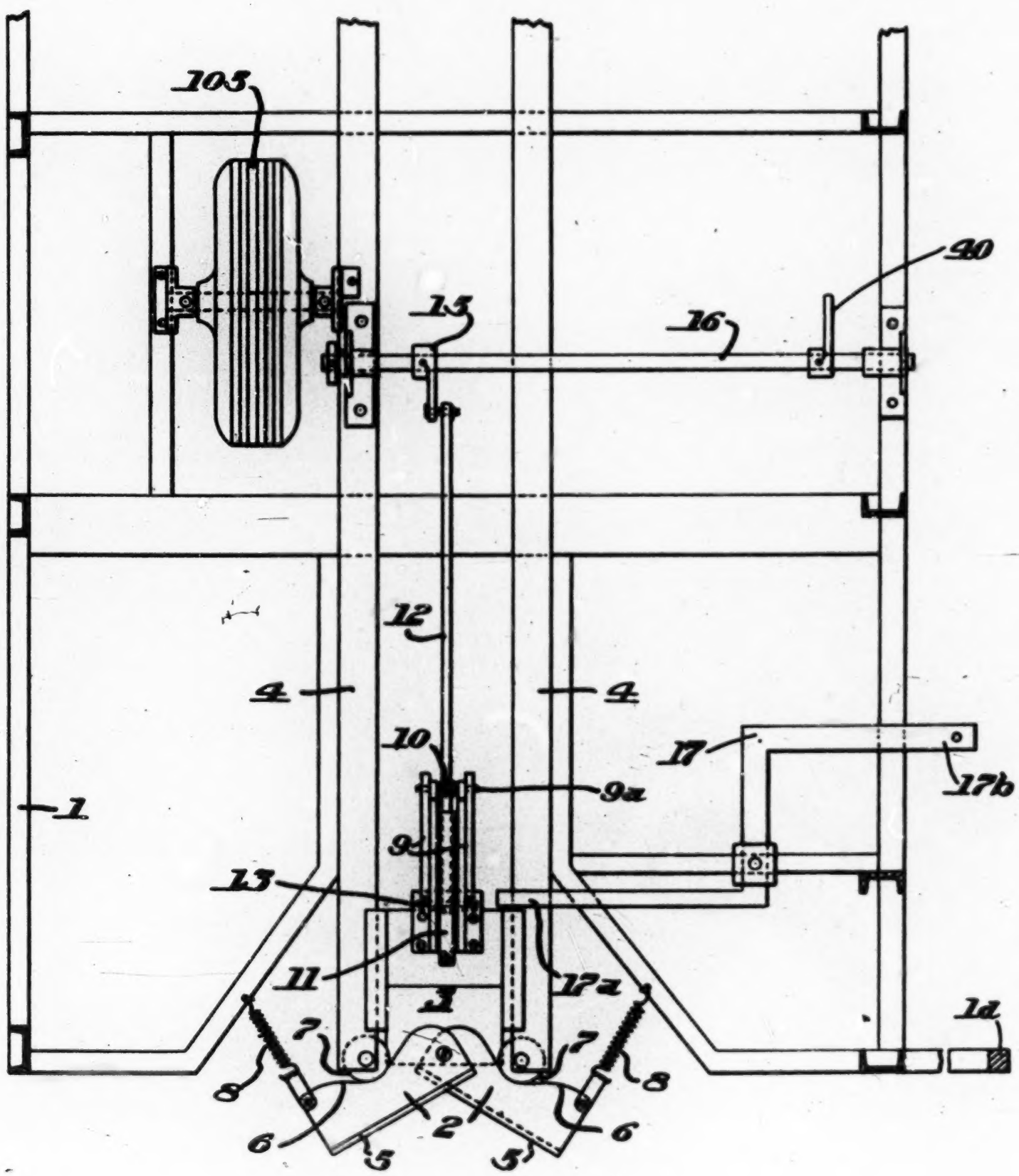

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Fig. 6.

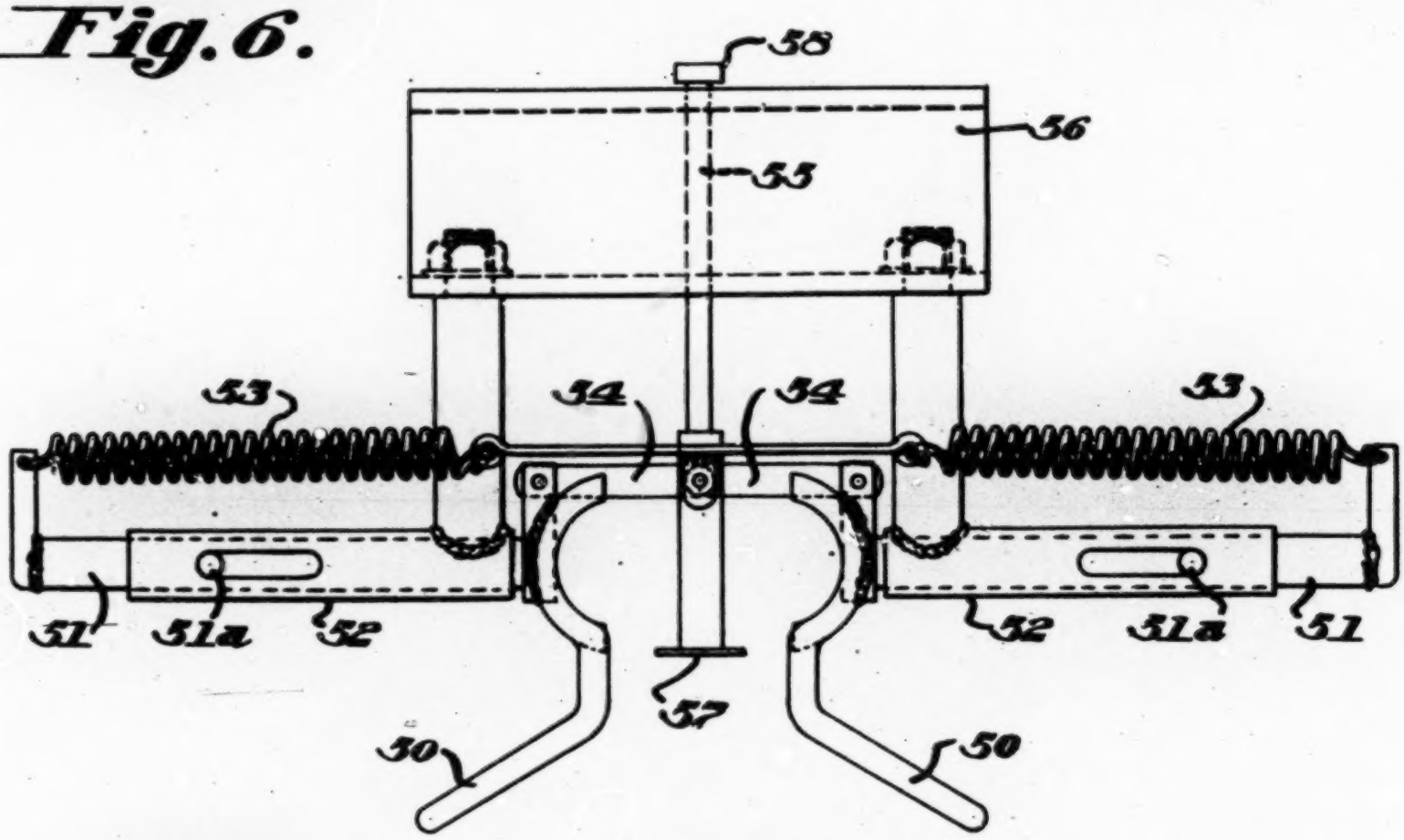
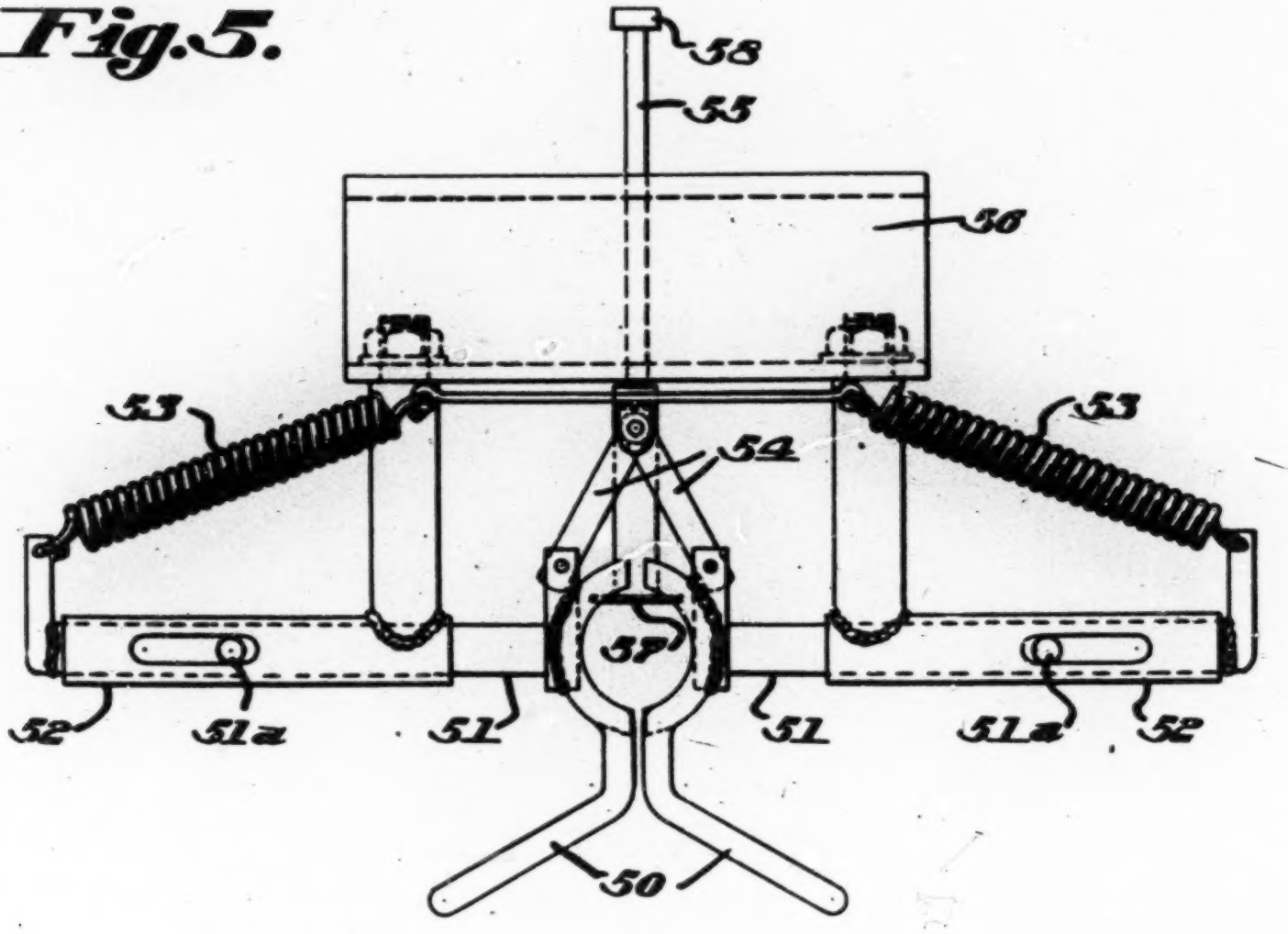


Fig. 5.



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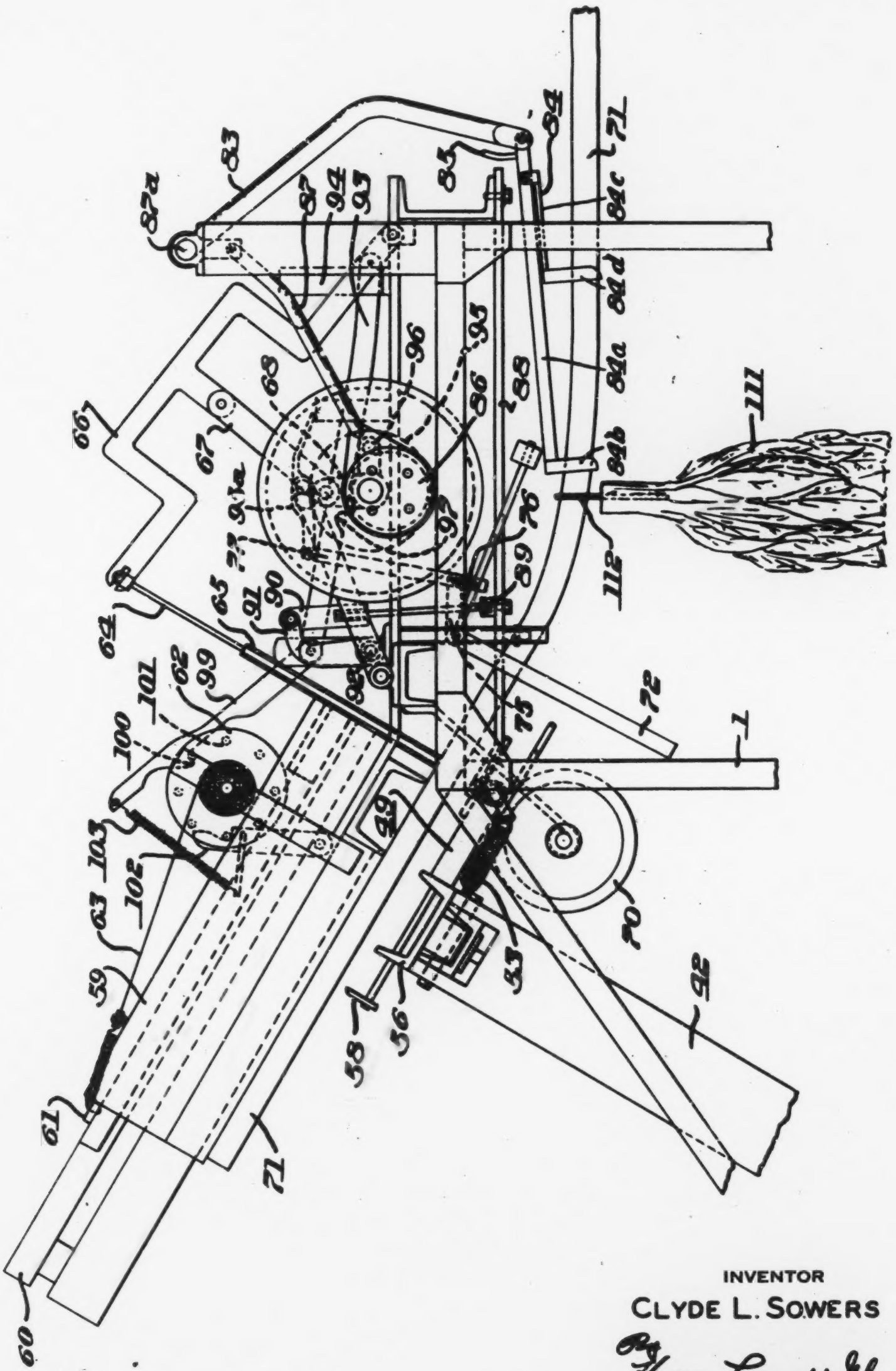

Fig. 7.

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HARVESTING MACHINE FOR TOBACCO PLANTS AND THE LIKE

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Fig. 8.

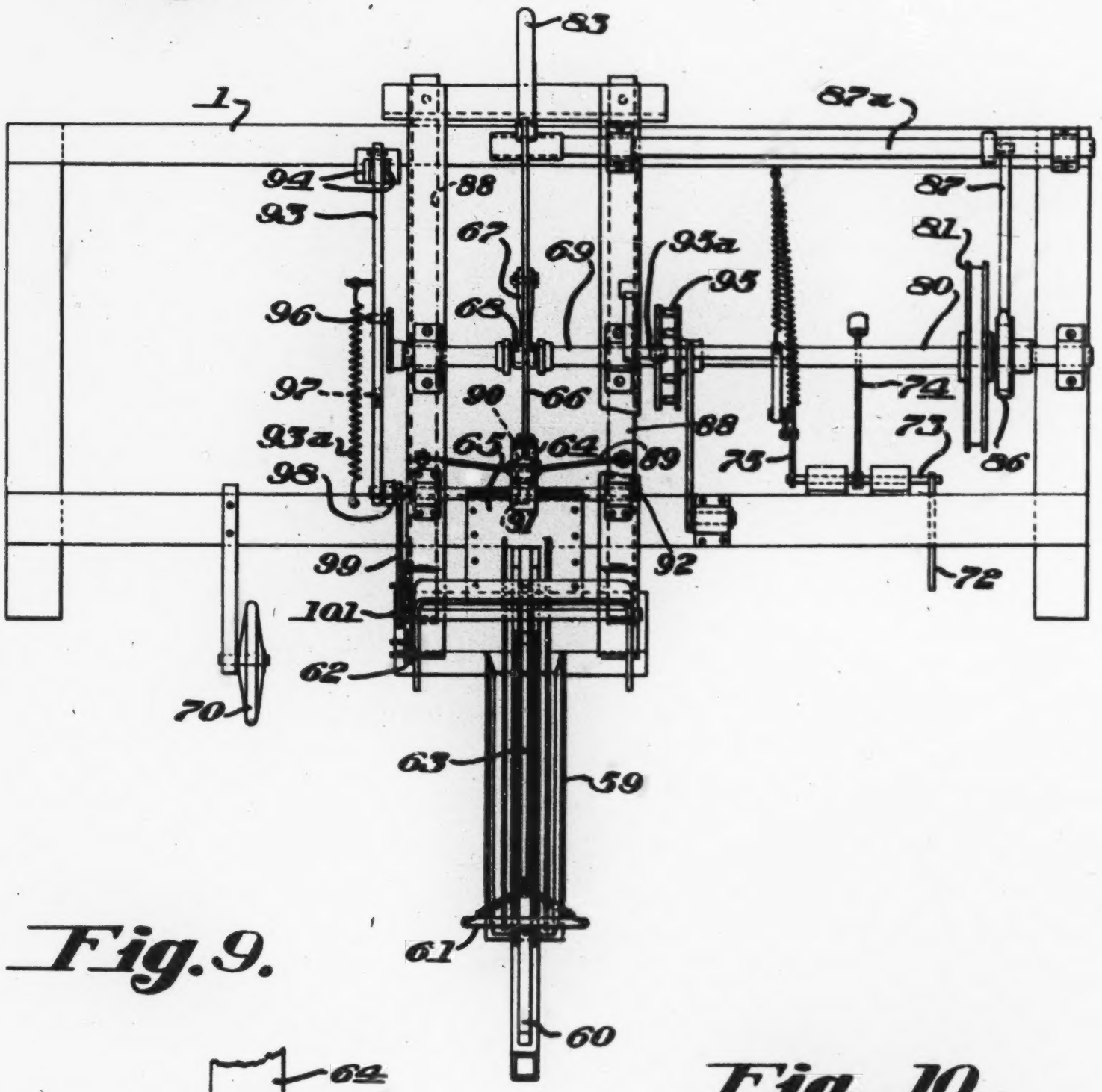


Fig. 9.

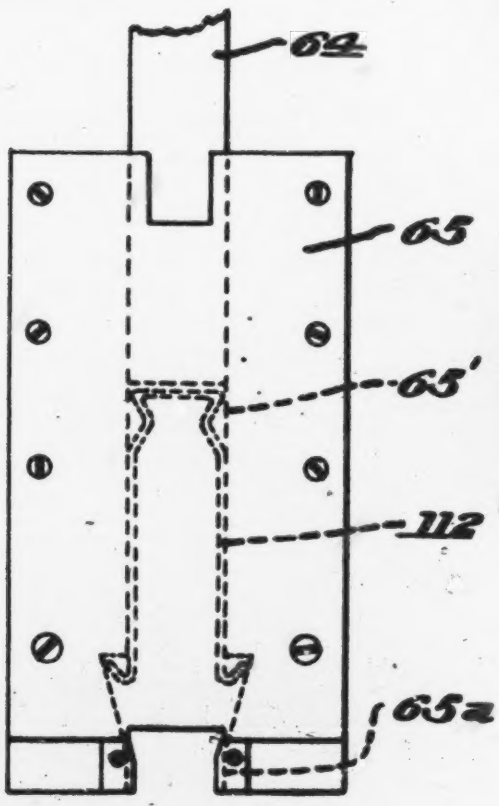
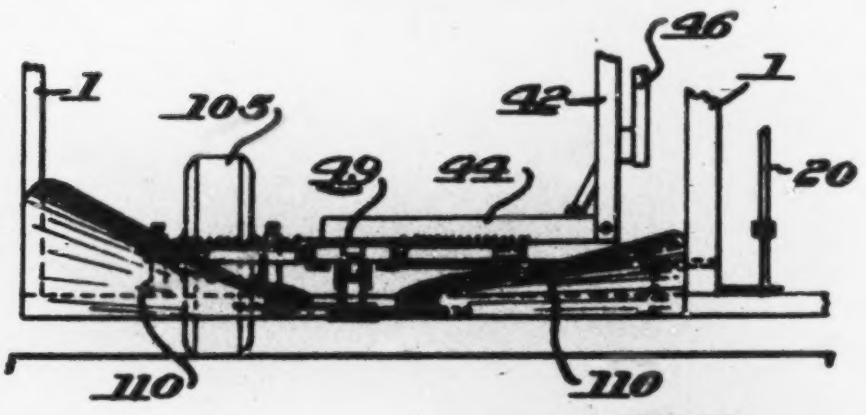


Fig. 10.



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HARVESTING MACHINE FOR TOBACCO PLANTS AND THE LIKE

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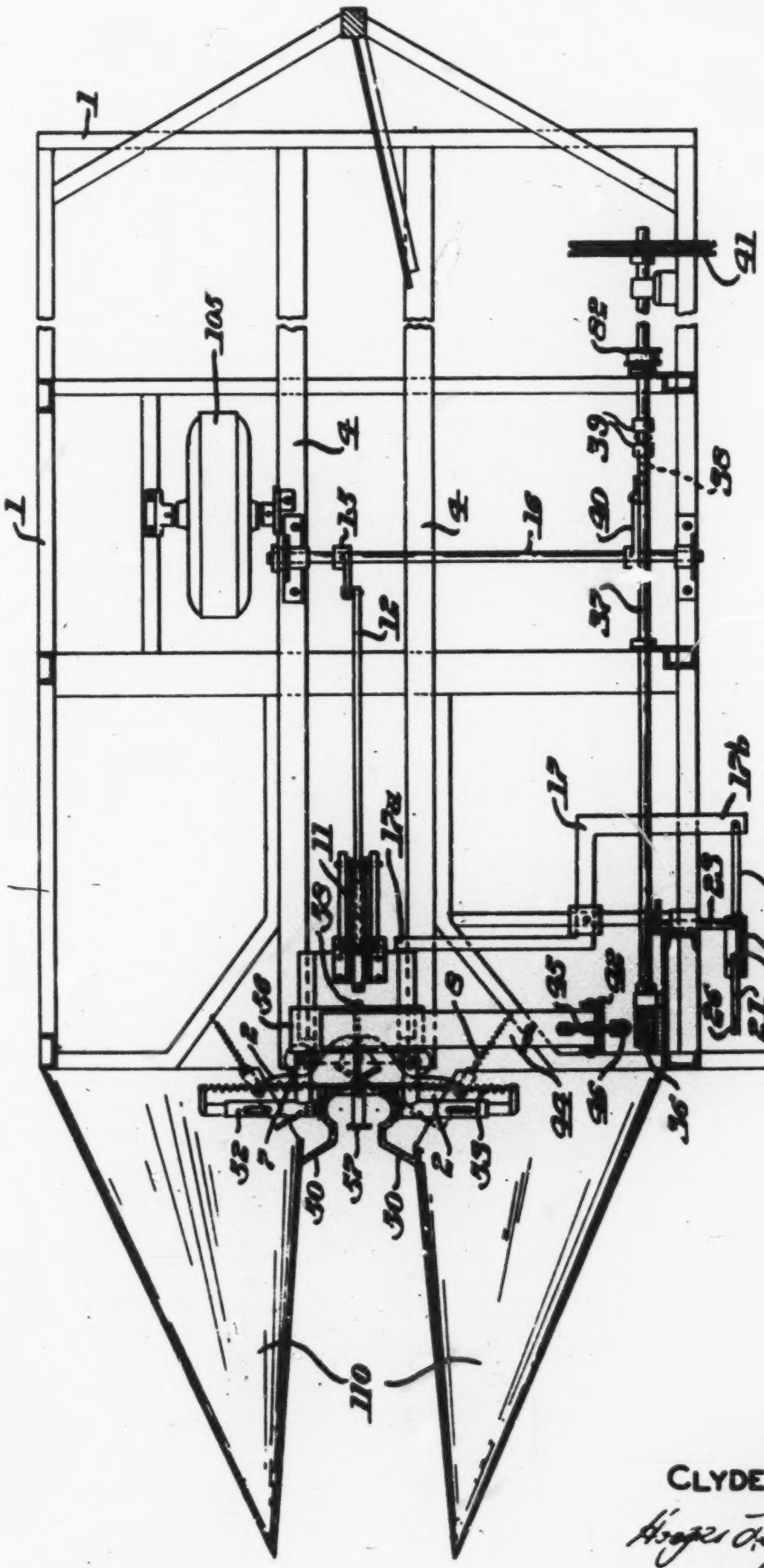
Fig. 12.



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UNITED STATES PATENT OFFICE

2,564,614

HARVESTING MACHINE FOR TOBACCO PLANTS AND THE LIKE

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Application May 10, 1949, Serial No. 92,304

22 Claims. (Cl. 56—27.5)

1

This invention relates to a harvesting machine for tobacco plants and the like and more particularly to a harvesting machine for harvesting and hanging such plants without damaging the leaves or stalks. The harvesting of tobacco has in the past been a long, tedious and, consequently, expensive step in the growing of tobacco. In harvesting fine tobacco especially, it has been necessary to cut and hang the plants by hand in order to preserve the outer leaves and stalk from damage. Since the quality of tobacco is very closely related to the physical condition of the leaves as well as to the type of tobacco, it is essential that the leaves be preserved in the best possible condition. It is therefore necessary that any machine used for harvesting tobacco must not only cut and hang the plant but must do so without tearing or bruising the leaves.

It is well-known that tobacco and certain other types of plant stalks have, when mature, a somewhat pithy or soft center or even a hollow center surrounded by a harder shell of plant material which although it may be resilient is still strong enough to support the weight of the plant.

I have invented a harvesting machine for plants of this type, in which I take advantage of the characteristic stalk structure described above. My invention will cut and hang such plants without damage to the exterior leaves and, in the case of tobacco, in a manner comparable to the best hand-cut product. I shall describe the structure of my harvesting machine as particularly applied to the harvesting of tobacco but it may be used for harvesting any like plant where the problems of harvesting are similar.

The harvesting machine of my invention comprises, in general, a main frame having severing means adapted to cut the tobacco plant adjacent the ground and a rotary conveying means pivoted on the frame and passing adjacent the severing means to carry the tobacco plant upward to an inverted position where it is automatically removed onto a hanger. The frame may be mounted on the side of a tractor or it may be drawn along a row of plants by any other suitable source of motive power. Connections are provided through which the severing means and the conveying means may be operated each time a plant to be harvested enters the conveying means. Removing means and connections through which said means may be operated each time a plant comes adjacent the removing means are provided on the frame for

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removing a plant delivered from the severing means by the conveying means.

Generally, the severing means may be in the form of a pair of blade members pivotally mounted on a base plate which is slidable in guide members on the frame, which base plate is adapted to draw the blades into the guide members to close them in shearing relation about a plant. The base plate may be actuated by a reciprocating arm which is slidably engaged thereon and which has a spring loaded depressible engaging member adapted when depressed to lock the arm and base plate in positive engagement. The conveying means is preferably made up of a plurality of radially disposed arms extending outwardly from a hub which is pivoted on the frame and is rotatable in a vertical plane. A lifting member is pivoted in the end of each of these arms and normally extends therefrom at an angle of about 90°. This lifting member is retractible to a position parallel with and adjacent the arm upon which it is pivoted. Cam means on the frame adjacent the hub act to retract and drop the lifting member at the proper time for lifting a plant. Gripping means may be provided on each of the lifting arms for gripping the plant adjacent the severing blades before completion of the severing operation. This gripping means may include a plurality of spring loaded fingers extending forward of the conveying means and lying above the severing means, said fingers being held apart by collapsible toggle arms which are connected together by a pivot pin and which are adapted to be collapsed by a trip member connected to the pivot pin and extending between the fingers where it is in position to strike a standing stalk. The trip means is also adapted to depress the engaging member on the reciprocating arm which causes the arm and base plate to engage drawing the knife blades back into the guide members in shearing engagement about the butt of a plant held in the fingers of the gripping means.

The removing means may include hanger means suspended from the frame and lying adjacent the circumference of a circle described by the rotating gripping means, stapling means securing the tobacco plant on the hanger means and release means for releasing the fingers of the gripping means from about the stalk of the plant.

The connections through which the various parts of the structure of this invention are made to operate may be connected to the power take-off of the tractor used to convey it, or from

a source of power mounted on the frame or from any other suitable and available source of power.

In the accompanying drawing I have illustrated a present preferred embodiment of my invention in which

Figure 1 is a side elevation of a tobacco harvester according to my invention;

Figure 2 is a front elevation of the same harvester with a portion of the rotating arms broken away;

Figure 3 is a partial side elevation of my tobacco harvester showing the severing means and a portion of the conveying means;

Figure 4 is a section on the line IV—IV of Figure 1;

Figure 5 is a plan view of the gripping means in closed position;

Figure 6 is a plan view of the gripping means in open position;

Figure 7 is a side elevation of the removing means of my invention including stapling means, hanger member and release means;

Figure 8 is a plan view of the removing means;

Figure 9 is an end elevation of the staple box;

Figure 10 is a partial front elevation showing deflector members mounted on the frame; and

Figure 11 is a partial section through a stapled tobacco plant.

Figure 12 is a section on the line XII—XII of Figure 1.

Referring first to Figure 1, I have illustrated a tobacco harvester having a main frame generally indicated at 1. A pair of severing blades 2 are pivotally mounted on a base plate 3 slidable in guide members 4 on the frame (see Figure 4). Each of the blades 2 has a cutting edge 5 and a rear cam surface 6 adapted to pass over a roller 7 rotatably mounted on the end of each guide member 4. A spring 8 connects the outer edge of the blade 2 with the frame 1 so as to maintain the blades in the open position when the base plate 3 is forward in the guide members. Spring loaded depressible engaging member 9 made up of two arms rotating on a pin 9a is mounted at the rear of the base plate 3. A spring 10 tends to keep the engaging member 9 in a generally horizontal position over the base plate. A ramp 11 is mounted on the front of the engaging member 9 where it cooperates with a trip member, later to be described, to force the engaging member 9 downwardly into the base plate. An arm 12, having in one end a pin 13 slidable in a slot 14 in the base plate 3, reciprocates between the guide members 4. The opposite end of the arm 12 is connected to a crank arm 15 on a transverse shaft 16 journaled on the frame.

A release arm 17 is pivoted intermediate its ends on a pin fixed to the frame. One end 17a of the arm 17 lies at the rear of the base plate 3 so that movement of the base plate causes the arm to pivot. The opposite end 17b of the arm 17 has an upwardly extending arm 18 pivoted thereon. The opposite end of the arm 18 carries a forked member 19 which engages the lower end of a toggle link 20 having a projecting arm 21 at right angles to its end. A second toggle link 22 is pivoted to the end of the toggle link 20 and the opposite end is mounted on a pin 23 journaled on the frame and connected to an arm 24 which cooperates with a spring 25 fastened to the frame to maintain the toggle arm 22 and the arm 21 in the generally horizontal direction. The arm 21 abuts a release member 26 which is connected to a pair of brake members 27 forming a part of a one-revolution clutch generally indicated at 28. The brake members 27 are mounted on a disk 29 which is firmly attached to a sleeve member 30 rotatable on a driven shaft 31. When the release arm 17 is actuated by the movement of the base plate 3 it moves the arm 18 forward along the frame causing the forked member 19 to engage the toggle link 20 which is drawn downwardly against the pressure of the spring 25. This frees the release member 26 from the arm 21 permitting the brake shoes 27 to spring outwardly against a drum 32' which is firmly attached to the drive shaft 31, this causes the disk 29 and sleeve 30 to rotate with the shaft 31. A sprocket wheel 32 mounted on the sleeve 30 transmits the motion of the sleeve 30 to a second sprocket 33 through a sprocket chain 32a. The sprocket wheel 33 is mounted on a shaft 34 which passes through the frame and is journaled therein. The shaft 31, which carries sprocket wheel 32, is driven by a worm gear 35 which engages a worm 36 on the end of a main drive shaft 37.

The shaft 16 which actuates the cutter arm is also driven by the main drive shaft 37 through toggle arms 38 connecting a crank 39 on the main drive shaft and a toggle link 40 and crank 40a on the shaft 16. The drive shaft 37 is adapted to be driven by a V-belt connection from the power take-off of the tractor through the pulley 41 on the end of the shaft.

A plurality of conveyor arms 42 are radially disposed about a hub 43 which is fixedly mounted on the shaft 34. A lifting arm 44 is pivoted to the outer end of each radially disposed arm and is adapted to be retracted to a position adjacent the radially disposed arm 42 upon which it is pivoted by means of a link 45 and sliding member 46 mounted on the radially disposed arm. The retraction is brought about by the sliding movement of the cam member 46 as a cam follower 47 on its inner end follows a cam track 48 mounted on the frame and surrounding the shaft 34. A gripping means 49 is mounted on the lifting arm 44 adjacent its outermost end. The gripping means is made up of a plurality of fingers 50 which are fastened to the ends of sliding arms 51 mounted in a tubular member 52 which forms a part of the gripper base. The arms 51 are under tension from a pair of springs 53 which tend to draw them together at the center. The fingers 50 and the sliding arms 51 are held apart by a pair of toggle links 54 which are pivoted on a trip member 55 slidably mounted in the base of the grip means 56. The trip member 55 has a forward projecting end 57 adapted to lie ahead of the cut of the severing blades and in the center of the open fingers 50. When a plant strikes the end 57 of the trip member, the toggle links 54 are forced backward releasing the fingers 50 and the sliding arms 51 causing the fingers 50 to grip the plant stalk. At the same time, the opposite end 58 of the trip member engages the ramp 11 on the engaging member 9 thereby depressing the engaging member and causing the severing blades 2 to be drawn back into the guide members by the reciprocating arm 12. This movement cuts the stalk and actuates release arm 17 thereby starting the conveyor.

A staple container 59 is mounted on the top of the frame. A staple track 60 extends down through the center of the container 59 and supports a load of staples in proper stapling position

in the box. A follower 61 is mounted on the staple track 60 and acts to move the staples forward in the container by reason of the tension exerted thereon by the ratchet wheel 62 and spring steel line 63. A driving head 64 is mounted in slots 65' at either side of the delivery end of the staple container. The slots have a restricted end 65a which compresses the barbs of a staple 112 as it leaves the container so that they spring out into the shell of the plant after the staple is driven (see Figure 9). The driving head is slidably attached to one end of an arm 66 pivoted on the frame. Movement of arm 66 about its pivot on the frame causes the driving head to reciprocate in the slots 65' thereby forcing a staple 112 into a stalk 111. A crank arm 67 mounted on an eccentric 68 intermediate the ends of the shaft 69 actuates the arm 66.

A supporting wheel 70 is mounted on the frame so that the end of the lifting arm 44 will rest thereon while the driving head 64 forces a staple from the staple container 59 through the guide slot 65 over the hanger member 71 into the butt of the plant.

A trip member 72 is mounted on a shaft 73 which is journaled on the frame. The trip member 72 is adapted to lie in the path of the rotating arms of the conveying means. When one of the rotating arms strikes the trip member 72, the trip member is raised upwardly until released by the arm. When released it drops downwardly and swings through its former position by virtue of the momentum caused by its own weight and the weight of a counterbalance 74 which is suspended from the shaft 73. A crank arm 75 on the opposite end of the shaft from the trip member 72 is forced upwardly in a slot 76 in a release arm 77. Continued movement of the crank arm 75 raises the release arm which releases a one-revolution clutch 78 connecting the shaft 69 with the shaft 69. The shaft 69 is continuously rotated through belt connection 81a between a pulley 81 mounted thereon and a pulley 82 on the main drive shaft 37.

After a plant is stapled by the action of the drive head 64, release members 88 move against pins 51a on the sliding arms 51 of the gripper means and open the gripper fingers. Each of the release members 88 is pivoted at one end to the frame. A pair of toggle links 89 are pivoted together at one end to a link 90, and the opposite end of each is pivoted on one of the release members 88. The link 90 is connected to the end of a bell crank 91 which is mounted on a rock shaft 92 journaled in the frame. The shaft 92 is caused to oscillate by a sliding arm 93 which slides backward and forward in the guide members 94. A crank arm 95 on the end of the shaft 69 engages a notch 97 in the bar 93 as the shaft rotates causing the bar to move backward in the guide members 94 drawing with it the crank arm 96 which is mounted on the end of the shaft 92. A return spring 93a returns the bar 93 to its original position after released by the crank arm 95. The movement of the crank arm 96 depresses the bell crank 91 thereby applying pressure on the upper ends of the toggle links 89 which press upon members 88 at an acute angle to the plane of their movement thereby causing them to move apart across the rollers 90a. As the members 88 move apart they contact the gripper means, forcing them apart and opening the gripper fingers and spreads the release members 88. At the same time, the ratchet arm 99 which is connected to the crank arm 96 draws the ratchet wheel 62 forward by means of a tooth 100 thereon which engages a pin 101 on the wheel. The ratchet wheel is moved forward the distance between two adjacent pins and is locked in position by means of the catch 102 which engages a pin on the ratchet wheel. The catch 102 and ratchet arm 99 are connected by a spring 103 so that the catch remains in positive engagement with the ratchet pins 101 at all times.

A continuously reciprocating arm 83 pivoted on the frame carries a raking member 84 which is adapted to draw the stapled plants along the hanger member. The raking member 84 is made up of a main arm 84a pivoted at one end on the free end of reciprocating arm 83 and terminating at the other end in a forked member 84b having fingers adapted to pass over and lie one on each side of the hanger member 71. An auxiliary raker arm 84c is hinged at one end to and depends from the main arm 84a adjacent its pivoted end. A second forked member 84d having fingers adapted to pass over and lie one on each side of the hanger member 71 is attached to the free end of the auxiliary raker arm. When the member 83 moves forward the raking member 84 is moved forward along the hanger member until a pin 85 projecting upwardly thereon strikes the back of the frame whereupon continued movement of the arm 83 raises the raking member 84 permitting the stapled plants to slide downwardly beneath the rake. Backward movement of the member 84 drops the raking member behind the stapled plant and draws the plant toward the rear of the frame. The reciprocating arm 83 is connected to an eccentric 86 on the shaft 69 by a connecting arm 87 and shaft 87a.

A pneumatic tired wheel 105 is journaled on a shaft 105a on the base of the frame 1 to aid in carrying the weight of the harvester when mounted on the side of a tractor. It is of course obvious that the number and position of such supporting wheels may be changed to suit the type of motive power. In operating the harvesting machine above described, the frame 1 is attached to a tractor, for example, by bolting the side member 1a of the frame 1 to the frame of the tractor and the pulley 41 on the main drive shaft 37 is connected through a belt to the power take-off of the tractor. If a source of motive power be used which does not have a power take-off, then a small gasoline motor may be mounted on the frame or any other drive means may be utilized. The frame is moved along a tobacco row in such a manner that the trip member 55 is in line with the row of plants. As the machine is moved forward along the row a pair of removable deflector members or snouts 110 mounted on the frame and extending forward thereof, one on either side of the severing blades 2, lift the lower leaves of a plant and support them above the severing blades. On continued forward movement the contact end 57 of the trip member 55 strikes a plant stalk 111, releasing the toggle links 54 causing the gripping fingers 50 to grip the plant stalk. At the same time, the opposite end 56 of the trip member engages the ramp 11 on the engaging member 9 thereby depressing the engaging member and causing the severing blades 2 to be drawn back into the guide members 4 by the reciprocating arm 12 which is continuously driven from the main drive shaft 37 by the transverse shaft 16 and crank arm 15. The movement of the severing blades as directed by the cam surfaces 6 and rollers 7 cuts the plant

stalk and leaves it free from the ground, supported only by the gripping fingers.

When the blades are drawn back the release arm 77 is pivoted on the frame and acts through the linkage made up of members whose action has previously been described to release the brake members 27 of the one-revolution clutch 26. These brake members spring outward against the drum 32 and connect the sleeve 30 with the continuously rotating shaft 31 which is driven by the main drive shaft 37 through the worm 36 and worm gear 35.

The sleeve 30, carrying sprocket wheel 32, rotates one revolution and is stopped by the release member 26 of the brake members striking the arm 21 thereby releasing the brake members from the drum.

The rotation of the sprocket wheel 32 is transmitted by a sprocket chain 32a to the sprocket wheel 33 which is mounted on a shaft 34 carrying the conveyor arms 42. The diameter of the sprocket wheel 33 is so related to the diameter of the sprocket wheel 32 that one revolution of sprocket wheel 32 will turn the conveyor arms 42 only the distance between two arms. In this way an arm carrying a tobacco stalk in its gripping fingers will be moved away and replaced by the next adjacent arm each time the sprocket 32 makes a single revolution.

As the conveyor arms 42 revolve they carry the plant stalks about a circle so that when the stalk comes adjacent a point about 145° from the point where it was cut it is in substantially inverted position. At this point, the end of lifting arm 44, which is pivoted on the conveyor arm and which carries the gripping means and stalk, rests upon the supporting wheel 78.

In rotating to this point, however, the conveyor arm must strike the trip member 72 which when released swings downwardly actuating the release arm 77 which lifts a stop 86a permitting the one-revolution clutch 85 to connect the continuously rotating shaft 80 with the shaft 86. The shaft 86 is connected through a pulley 81 and belt 81a to a pulley 41 on the main drive shaft 37. When the shaft 86 rotates through one revolution, the arm 88 is first drawn downwardly which forces the driving head 84 down the slots 65 in the delivery container carrying with it a staple 112. The staple passes down over the hanger member 71 into the cut end of the stalk which is held in inverted position by the gripping fingers. As the shaft 86 continues its rotation and starts to lift the arm 88, the crank arm 96 on the end of the shaft 86 engages the notch 97 in the sliding arm 92 and draws it back through the guide members 94. The sliding arm is connected to the crank arm 96 which rotates the shaft 92 for a part of a revolution when the sliding arm moves. This causes the bell crank 91 to spread the toggle links 89 and thereby spread the release members 88 which move against pins 81a on the sliding arms 81. This opens the gripping fingers 82 to a point where toggle links 94 look them in the open position and releases the staple plant stalk which is suspended on the hanger member by the staple driven into its cut end.

When the crank arm 96 oscillates its also draws the ratchet arm 99 in the direction of oscillation. This causes the tooth 100 on the ratchet arm to engage a pin 101 on the ratchet wheel 98 and to rotate the ratchet wheel the distance between a pair of the pins on said ratchet wheel. This in turn draws the follower 91 along the staple track

96 forming a new staple in position for stapling. As the crank arm 96 rotates the remainder of its revolution it releases the sliding arm which is drawn back to its original position by the spring 95a, bringing the release members 88 back to normal position and moving the ratchet arm back away from the pin 101. The ratchet catch 102 then holds the ratchet wheel in its new position by engaging one of the pins 101.

The stapled stalk 111, which is now suspended on the hanger member 71 by the staple 112, is drawn toward the rear of the frame by the raking member 84 whose movement has already been described. As the stapled stalks accumulate they are forced back from the hanger member 71 onto a secondary hanger member or "lath" 106 which is suspended on one end in a troughlike end 71a on the hanger member and on the other end by a rotating turntable 107 which is adapted to hold a plurality of such laths. The turntable has a plurality of slotted holders 108, each of which is adapted to hold a lath. Each of these holders is pivoted on the turntable so that the laths can be carried in the vertical direction and each has a leveling screw 109 below it to bear the weight of the lath and contents when lowered to the horizontal position. When a lath is filled with plants it is removed from its position between the hanger member 71 and the turntable 107 and is placed on a rack wagon for transfer to the drying barns. A new lath is then immediately moved into position for filling.

The lifting arm 44 moves away from the supporting wheel 78 when a new plant is contacted and is retracted into a position adjacent and parallel to the radially disposed conveyor arm 42 by the action of cam member 48, cam follower 47 and cam track 46. The lifting arm remains in this position until ready to drop into position over the severing means to receive the next plant in the row at which time the same cam mechanism drops it into place. This retracting mechanism is designed to prevent injury to succeeding plants in the row by the movement of the lifting arms.

While I have shown and described a present preferred embodiment of the invention, it is to be understood that the invention is not limited thereto but may be otherwise variously embodied within the scope of the following claims.

I claim:

1. A harvesting machine for tobacco plants and the like comprising a main frame, severing means on the frame, rotatable conveying means including a plurality of radially disposed arms mounted on a hub pivoted on the frame and adapted to rotate in a vertical plane, a lifting member pivoted in the end of each arm and having gripping means mounted thereon for gripping the plant adjacent the severing means, trip means on the gripping means adapted to close said gripping means about the plant, connections actuated by said trip means and connecting the severing means, the conveying means and a source of power whereby the severing means and conveying means are operated each time a standing plant strikes the trip means, and removing means mounted on the frame adjacent the circumference of the circle formed by the rotating conveying means and actuated thereby for removing the harvested plant from the gripping means.

2. A harvesting machine for tobacco plants and the like comprising a main frame, severing means on the frame, rotary conveying means pivoted on the frame to pass adjacent the severing means,

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connections between the severing means, the conveying means and a source of power whereby the severing means and conveying means are intermittently operated each time a standing plant to be harvested enters the conveying means, hanger means suspended from the frame, a portion of which extends substantially tangential to the circumference of the circle formed by the rotating conveying means, stapling means mounted on the frame adjacent the hanger means for securing the tobacco plant on the hanger means and connections actuated by the conveying means and connecting the source of power and the stapling means whereby the stapling means is operated intermittently each time a plant comes adjacent the hanger means.

3. A harvesting machine for tobacco plants and the like comprising a main frame, severing means on the frame, rotary conveying means pivoted on the frame to pass adjacent the severing means, gripping means on the conveying means for gripping the butt of the plant adjacent the severing means, trip means on the gripping means, connections actuated by the trip means and connecting the severing means, the conveying means and a source of power whereby the severing means and conveying means are intermittently operated each time a standing plant strikes the trip means, hanger means suspended from the frame so as to lie adjacent the circumference of the circle formed by the rotating conveying means, stapling means mounted on the frame adjacent the hanger means securing the tobacco plant on the hanger means and connections actuated by the conveying means and connecting the source of power and the stapling means whereby the stapling means is made to operate intermittently each time a plant comes adjacent the hanger means.

4. A harvesting machine for tobacco and the like plants comprising a main frame, severing means on the frame, rotatable conveying means pivoted on the frame to rotate in a vertical plane, gripping means on the conveying means for gripping the butt of the plant adjacent the severing means, trip means on the gripping means, connections actuated by the trip means and connecting the severing means the conveying means and a source of power whereby the severing means and conveyings means may be operated each time a standing plant strikes the trip means, hanger means suspended from the frame so as to be in spaced apart relation to the circumference of the circle made by the rotating gripping means and extending in a generally horizontal direction, stapling means mounted on the frame adjacent the hanger means, for securing the plant on the hanger means, release means on the frame adjacent the stapling means for releasing the plant from the gripping means and connections actuated by the conveying means and connecting the source of power with the stapling means and the release means whereby the stapling means and release means may be made to operate successively each time a plant comes adjacent the hanger means.

5. A harvesting machine for tobacco and the like plant comprising a main frame, severing means on the frame, rotatable conveying means pivoted on the frame to rotate in a vertical plane, gripping means on the conveying means for gripping the plant adjacent the severing means, trip means on the gripping means causing the gripping means to engage the plant before completion of the severing operation, connections actuated by the trip means and connecting the severing means, the conveying means and a source of power whereby the severing means and conveying means are intermittently operated each time a standing plant strikes the trip means, hanger means suspended from the frame adjacent the circumference of a circle made by the rotating gripping means, stapling means on the frame on the opposite side of the hanger means from the conveying means inserting a staple over the hanger means and into the tobacco plant in the gripping means, release means on the frame adjacent the gripping means for releasing the plant from the gripping means and connections actuated by the conveying means and connecting the source of power with the stapling means and release means whereby the stapling means and release means may be made to operate successively and intermittently each time a plant butt comes adjacent the hanger means.

6. A harvesting machine for tobacco and the like plant comprising a main frame, a pair of severing members mounted on the frame in shearing relation, rotatable conveying means pivoted on the frame to rotate in a vertical plane to raise a severed plant to the inverted position, gripping means on the conveying means for gripping the plant adjacent the severing members, trip means on the gripping means, connections actuated by the trip means and connecting the severing means, the conveying means and a source of power whereby the severing means and conveying means may be successively and intermittently operated each time a standing plant strikes the trip means, hanger means suspended from the frame adjacent the circumference of a circle made by the rotating gripping means, stapling means mounted on the frame adjacent the hanger means inserting a staple over the hanger means and into a plant butt thereby securing the tobacco plant on the harger means, release means on the frame adjacent the stapling means for releasing the plant from the gripping means, and connections actuated by the conveying means and connecting the source of power with the stapling means and the release means whereby the stapling means and release means may be made to operate successively and intermittently each time a plant butt comes adjacent the hanger means.

7. A harvesting machine for tobacco plants and the like comprising a main frame, severing means on the frame, rotatable conveying means including a plurality of radially disposed arms mounted on a hub pivoted on the frame and adapted to rotate in a vertical plane, a lifting member pivoted in the end of each arm and having gripping means mounted thereon for gripping a plant adjacent the severing means, trip means on the gripping means adapted to close the gripping means about the plant, connections actuated by the trip means and connecting the severing means, the conveying means and a source of power whereby the severing means and conveying means may be successively and intermittently operated each time a standing plant strikes the trip means, hanger means suspended from the frame and lying adjacent the circumference of a circle described by the rotating gripping means, stapling means mounted on the frame on the side of the hanger means opposite the conveying means inserting a staple over the hanger means and into a plant butt thereby securing the tobacco plant on the hanger means, release means on the frame adjacent the stapling means re-

leasing the plant from the gripping means after the staple is inserted, and connections actuated by the conveying means and connecting the source of power with the stapling means and the release means whereby the stapling means and release means may be made to operate successively and intermittently each time a plant butt comes adjacent the hanger means.

8. A harvesting machine for tobacco plants and the like comprising a main frame, a pair of severing members mounted on the frame in shearing relation, rotatable conveying means including a plurality of radially disposed arms extending outwardly from a hub mounted on the frame and adapted to rotate in a vertical plane, a lifting member pivoted in the end of each arm, cam means on the hub raising and lowering the lifting members at predetermined points in the rotation of the arms, gripping means mounted on the lifting members for gripping a plant adjacent the severing members, trip means on the gripping means adapted to close the gripping means about the plant, connections actuated by the trip means and connecting the severing means, the conveying means and a source of power whereby the severing means and conveying means may be successively operated each time a standing plant strikes the trip means, hanger means suspended from the frame and lying adjacent the circumference of a circle described by the rotating gripping means, stapling means on the frame adjacent the hanger means inserting a staple over the hanger means and into a plant butt thereby securing the tobacco plant on the hanger means, release means on the frame for releasing the plant from the gripping means, and connections actuated by the conveying means and connectig the source of power with the staplig means and release means whereby the stapling means and release means may be made to operate successively each time a plant butt comes adjacent the hanger means.

9. A harvesting machine for tobacco plants and the like comprising a main frame, severing means on the frame, rotatable conveying means pivoted on the frame to rotate in a vertical plane, gripping means on the conveying means for gripping a plant adjacent the severing means, said gripping means including a plurality of spring loaded curved fingers extending forward of the conveying means and lying above the severing means, said fingers being held apart by collapsible toggle arms, a trip member connected to a pivot pin between the toggle arms to collapse the toggle arms and close the fingers about the plant each time a plant strikes the trip member, connections actuated by the trip means and connecting the severing means, the conveying means and a source of power whereby the severing means and conveying means may be successively operated each time a standing plant strikes the trip means, hanger means suspended from the frame apd lying adjacent the circumference of a circle described by the rotating gripping means, stapling means mounted on the frame on the side of the hanger means opposite the conveying means inserting a staple over the hanger means and into a plant butt thereby securing the tobacco plant on the hanger means, release means on the frame adjacent the circle described by the rotating gripping means for releasing the plant from the gripping means, and connections actuated by the conveying means and connecting the source of power with the stapling means and the release means whereby the stapling means and release means may be made to operate successively each time a plant butt comes adjacent the hanger means.

10. A harvesting machine for tobacco plants and the like comprising a main frame, a pair of severing blades pivoted on a base plate, said base plate being slidably mounted in guide members on the frame, a reciprocating arm slidably engaging the base plate, a spring loaded depressible engaging member on the reciprocating arm adapted when depressed to lock the arm and base plate into positive engagement, connections actuated by the movement of the base plate and connecting the reciprocating arm and a source of power whereby the reciprocating arm may be actuated, rotatable conveying means pivoted on the frame to rotate in a vertical plane and to raise a severed plant to the inverted position, gripping means on the conveying means for gripping a plant adjacent the severing blades before completion of the severing operation, trip means on the gripping means, said trip means causing the gripping means to close and the engaging member on the reciprocating arm to depress each time the trip means strikes a standing stalk, release means pivoted on the frame and actuated by the base plate to release the conveying means, connections between the source of power and the reciprocating arm connections operating the conveying means each time said conveying means is released by the base plate, hanger means suspended from the frame and lying adjacent the circumference of a circle described by the rotating gripping means, stapling means mounted on the frame on the side of the hanger means opposite the conveying means inserting a staple over the hanger means and into a plant butt thereby securing the plant on the hanger means, a second release means on the frame adjacent the circle described by the rotating gripping means and connections from the stapling means and the second release to the reciprocating arm connections whereby the stapling means and release means operate successively and intermittently each time a plant butt comes adjacent the hanger means.

11. A harvesting machine for tobacco plants and the like comprising a main frame, a pair of severing blades pivoted on a base plate, said base plate being slidably mounted in guide members on the frame to close the blades in shearing relation, a reciprocating arm slidably engaging the base plate, a spring loaded, depressible engaging member on the reciprocating arm adapted when depressed to lock the arm and base plate in positive engagement, connections between the reciprocating arm and a source of power whereby the reciprocating arm may be continuously actuated, rotatable conveying means including a plurality of radially disposed arms extending outwardly from a hub pivoted on the frame and rotatable in a vertical plane, a lifting member pivoted in the end of each arm and normally extending therefrom at an angle of about 90°, said lifting member being retractible to a position parallel with and adjacent the arm, cam means adjacent the hub for retracting the lifting member during a portion of the rotation of the conveying means, gripping means mounted on the lifting member for gripping a plant adjacent the severing blades, trip means on the gripping means closing the gripping means and depressing the engaging member on the reciprocating arm each time the trip means strikes a standing stalk, release means on the frame energized by the movement of the base plate to release the conveying means, con-

nections between the conveying means and the reciprocating arm connections through which the conveying means may be intermittently operated each time said conveying means is released by the base plate, hanger means suspended from the frame and lying adjacent the circumference of a circle described by the rotating gripping means, stapling means on the frame adjacent the hanger means inserting a staple over the hanger means and into a plant butt thereby securing the tobacco plant on the hanger means, a second release means adjacent the stapling means and a circle described by the rotating gripping means for releasing the plant from the gripping means, and connections with the reciprocating arm connections through which the stapling means and release means may be made to operate successively and intermittently each time a plant butt comes adjacent the hanger means.

12. A harvesting machine for tobacco plants and the like comprising a main frame, a pair of severing blades pivoted on a base plate, said base plate being slidably mounted in guide members on the frame with the severing blades in shearing engagement when the base plate moves in the guide members, a reciprocating arm slidably engaging the base plate, a spring loaded depressible engaging member on the reciprocating arm adapted when depressed to lock the arm and base plate in positive engagement, connections between the reciprocating arm and a source of power whereby the reciprocating arm may be actuated, rotatable conveying means pivoted on the frame to rotate in a vertical direction, gripping means on the conveying means for gripping a plant adjacent the severing blades, said gripping means including a plurality of spring loaded fingers extending forward of the conveying means and lying above the severing means, said fingers beings held apart by collapsible toggle arms, a trip member connected to a pivot pin between the toggle arms and adapted to collapse the toggle arms and close the fingers about the plant and to depress the engaging member on the reciprocating arm each time the trip member strikes a standing plant, release means pivoted on the frame and actuated by the movement of the base plate to release the conveying means, connections between the conveying means and the reciprocating arm connections through which the conveying means may be intermittently operated each time said conveying means is released by the base plate, hanger means suspended from the frame and lying adjacent the circumference of a circle described by the rotating gripping means, stapling means on the frame adjacent the hanger means inserting a staple over the hanger means and into a plant but thereby securing the tobacco plant on the hanger means, release means on the frame adjacent the stapling means for releasing the plant from the gripping means, and connections to the reciprocating arm connections operating the stapling means and release means successively and intermittently each time a plant butt comes adjacent the hanger means.

13. A harvesting machine for tobacco plants and the like comprising a main frame, severing means on the frame, rotatable conveying means including a plurality of radially disposed arms extending outwardly from a hub pivoted on the frame and rotatable in a vertical plane, a lifting member pivoted in the end of each arm and normally extending therefrom at an angle of about 90°, said lifting member being retractible to a position parallel with and adjacent each arm, cam means adjacent the hub for retracting the lifting member during a portion of the rotation of the conveying means, gripping means on the lifting member for grasping a plant adjacent the severing means, said gripping means including a plurality of spring loaded fingers extending forward of the conveying means and lying above the severing means, said fingers being held apart by collapsible toggle arms, a trip member connected to a pivot pin between the toggle arms and adapted to collapse the toggle arms and close the fingers about the plant, connections actuated by the trip member and connecting the severing means, the conveying means and a source of power whereby the severing means and the conveying means may be successively and intermittently operated each time the trip member strikes a standing stalk, hanger means suspended from the frame and lying adjacent the circumference of a circle described by the rotating gripping means, stapling means mounted on the frame on the opposite side of the hanger means from the conveying means securing the tobacco plant on the hanger means, release means adjacent the stapling means releasing the plant from the gripping means after the plant is stapled, and connections from the source of power to the stapling means and release means whereby the stapling means and release means successively and intermittently operate each time a plant butt comes adjacent the hanger means.

14. A harvesting machine for tobacco plants and the like comprising a main frame, severing means on the frame, rotatable conveying means pivoted on the frame to rotate in a vertical plane, gripping means mounted on the conveyor means for grasping a plant at a point adjacent the severing means, connections from a source of power whereby the severing means and conveying means are successively and intermittently operated each time a standing plant enters the gripping means, hanger means suspended from the frame in spaced apart relation to the circumference of the circle made by the rotating gripping means, stapling means on the frame for securing the plant on the hanger means, said stapling means including a staple container adapted to feed staples to a point adjacent the hanger means on the side opposite the conveying means, drive means on the end of the staple container for driving a staple from the container to pass over the hanger means and into a plant butt held in the gripping means, release means mounted on the frame adjacent the hanger means releasing the plant from the gripping means after the staple is inserted into the plant butt and connections from the source of power to the drive means and release means whereby the drive means and release means are successively and intermittently operated each time a plant comes adjacent the hanger means.

15. A harvesting machine for tobacco plants and the like comprising a main frame, severing means on the frame, rotatable conveying means pivoted on the frame to rotate in a vertical plane, gripping means mounted on the conveyor means for gripping a plant at a point adjacent the severing means, connections to a source of power whereby the severing means and conveying means may be successively and intermittently operated each time a standing plant enters the gripping means, hanger means suspended from the frame at a point adjacent the circumference of a circle made by the conveying means and including a curved supporting member having a U-shaped

channel at one end thereof and a removable member having one end inserted in said supported by said channel and having the other end supported by a turntable pivoted on the rear of the frame and rotatable in a horizontal plane, stapling means on the frame adjacent the hanger means, said stapling means including a staple container adapted to deliver staples to a point adjacent the curved supporting member of the hanger means on the side opposite the conveying means, drive means on the end of the staple container for driving a staple from the container to pass over the hanger means and into a plant butt held in the gripping means, release means on the frame adjacent the hanger means releasing the plant from the gripping means after the staple is inserted into the plant butt and connections between the severing means and conveying means connections and the drive means and release means whereby the drive means and release means are successively and intermittently operated each time a plant comes adjacent the hanger means.

17. A harvesting machine for tobacco plants and the like comprising a main frame, severing means on the frame, rotatable conveying means pivoted on the frame to rotate in a vertical plane, gripping means mounted on the conveyor means for gripping a plant at a point adjacent the severing means, connections to a source of power whereby the severing means and conveying means may be successively and intermittently operated each time a standing plant enters the gripping means, hanger means suspended from the frame and including a curved supporting member having a U-shaped channel at one end thereof and a removable member having one end inserted in said supported by said channel and having the other end supported by a turntable pivoted on the rear of the frame and rotatable in a horizontal plane, stapling means on the frame including the plant on the hanger means, said stapling means including a staple container adapted to deliver staples to a point adjacent the curved supporting member of the hanger means on the side opposite the conveying means, drive means on the end of the staple container driving a staple from the container to pass over the hanger means and into a plant butt held in the gripping means, release means for releasing the plant from the gripping means after the staple is inserted into the plant butt and connections actuated by the conveyor means and connecting the drive means and release means to the source of power whereby the drive means and release means are successively and intermittently operated each time a plant comes adjacent the hanger means, an arm pivoted on the frame above the hanger means and extending downwardly to a point adjacent the hanger means, downwardly extending fingers on the end of said arm opposite the pivot, a second arm, pivoted on the rod thereof adjacent the hanger means and having downwardly extending fingers thereon, said fingers of both arms fitting about the hanger means, stop means on the first arm preventing the second arm from assuming an obtuse angle with the first arm, cam means for reciprocating said first arm to cause the fingers of the both arms to draw the stapled plants along the hanger means and connections to the power source continuously driving said cam means.

18. A harvesting machine for tobacco plants and the like comprising a main frame, severing means on the frame, rotatable conveying means pivoted on the frame to rotate in a vertical plane, gripping means mounted on the conveyor means for gripping a plant at a point adjacent the severing means, connections between the severing means and conveying means whereby they may be successively and intermittently operated each time a standing plant enters the gripping means, hanger means suspended from the frame in spaced apart relation to the circumference of the circle made by the rotating gripping means, stapling means on the frame adjacent the hanger means inserting a staple over the hanger means into a plant butt held in the gripping means thereby covering the plant on the hanger means, a pair of release members pivoted at one end on the frame and lying in normally parallel spaced apart relationship on either side of the hanger means, each of said releasing members adapted to engage a pin on each side of the gripping means when it comes adjacent the hanger means, toggle links connected to the releasing members, rotating crank means for alternately spreading the toggle links apart thereby spreading the unpivoted ends of the releasing members and opening the gripping means, and connections actuated by the conveying means and connecting the stapling means and the crank means to the connection between the severing means and conveying means whereby the stapling means and crank means are successively and intermittently operated each time a plant comes adjacent the hanger means.

19. A harvesting machine for tobacco plants and the like comprising a main frame, severing means on the frame, rotatable conveying means pivoted on the frame to rotate in a vertical plane, gripping means mounted on the conveyor means for gripping a plant at a point adjacent the severing means, connections from a source of power to the severing means and conveying means whereby the severing means and conveying means may be successively and intermittently operated each time a standing plant enters the gripping means, hanger means suspended from the frame and including a curved supporting member having a U-shaped channel at one end thereof and a removable member having one end inserted in said and supported by said channel and having the

other end supported by a turntable pivoted on the rear of the frame and rotatable in a horizontal plane, stapling means on the frame inserting a staple over the hanger means and into a plant butt held in the gripping means thereby securing the plant at one end on the frame and lying in normally parallel spaced apart relationship on either side of the hanger means, each of said release members adapted to engage a pin on each side of the gripping means when it comes adjacent the hanger means, toggle links connected to the releasing members, rotating crank means for alternately spreading the toggle links apart thereby spreading the unpivoted ends of the releasing members and opening the gripping means, and connections actuated by the conveying means from the source of power to the stapling means and crank means whereby the stapling means and the crank means are successively and intermittently operated each time a plant comes adjacent the hanger means.

20. A harvesting machine for tobacco plants and the like comprising a main frame, severing means on the frame, rotatable conveying means pivoted on the frame to rotate in a vertical plane, gripping means mounted on the conveyor means for gripping a plant at a point adjacent the severing means, connections actuated by the entrance of a plant into the gripping means connecting the severing means, the conveying means and a source of power whereby the severing means and conveying means may be successively and intermittently operated each time a standing plant enters the gripping means, hanger means suspended from the frame in spaced apart relation to the circumference of the circle made by the rotating gripping means, stapling means on the frame for securing the plant on the hanger means, said stapling means including a staple container, adapted to feed staples to a point adjacent the hanger means on the side opposite the conveying means, drive means on the end of the staple container for driving a staple from the container to pass over the hanger means and into a plant butt held in the gripping means, a pair of release members, pivoted at one end on the frame and lying in normally parallel spaced apart relationship on either side of the hanger means, each of said releasing members adapted to engage a pin on each side of the grasping means when it comes adjacent the hanger means, toggle links connected to the releasing members, rotating crank means for alternately spreading the toggle links apart thereby spreading the unpivoted ends of the releasing members and opening the gripping means, and connections actuated by the conveying means and connecting the stapling means and the crank means to the source of power whereby the stapling means and the crank means are successively and intermittently operated each time a plant comes adjacent the hanger means.

21. A harvesting machine for tobacco plants and the like comprising a main frame, severing means on the frame, rotatable conveying means pivoted on the frame to rotate in a vertical plane, gripping means mounted on the conveyor means for gripping a plant at a point adjacent the severing means, connections actuated by the entrance of a plant into the gripping means connecting the severing means, the conveying means and a source of power whereby the severing means and conveying means may be successively and intermittently operated each time a standing plant enters the gripping means, hanger means suspended from the frame and including a curved supporting member having a U-shaped channel at one end thereof and a removable member having one end inserted in and supported by said channel and having the other end supported by a turntable pivoted on the rear of the frame and rotatable in a horizontal plane, stapling means on the frame inserting a staple over the hanger means into a plant butt held in the gripping means securing the plant on the hanger means, a pair of release members, pivoted at one end on the frame and lying in normally parallel spaced apart relationship on either side of the hanger means, each of said releasing members adapted to engage a pin on each side of the gripping means when it comes adjacent the hanger means, toggle links connected to the releasing members, rotating crank means for alternately spreading the toggle links apart thereby spreading the unpivoted ends of the releasing members and opening the gripping means, and connections actuated by the conveying means and connecting the stapling means and the crank means to the source of power whereby the stapling means and the crank means are successively and intermittently operated each time a plant comes adjacent the hanger means.

22. A harvesting machine for tobacco plants and the like comprising a main frame adapted to be attached to a tractor or other source of motor power, a pair of severing blades pivoted in shearing relation on a base plate, said base plate being slidably mounted in guide members on the frame to draw the blades into the guide members, means on said guide members for closing the severing blades in shearing relation when drawn into the guide members, a reciprocating arm slidably engaging the base plate, said reciprocating arm being pivoted at its end opposite the base plate on a rotating crank arm, connections from the source of power whereby the crank arm may be rotated, a spring loaded depressible engaging member on the reciprocating arm adapted when depressed to lock the arm and base plate in positive engagement, rotatable conveying means including a plurality of radially disposed arms extending outwardly from a hub pivoted on the frame and rotatable in a vertical plane, a lifting member pivoted in the end of each arm and normally extending therefrom at an angle of about 90°, said lifting member being retractible to a position parallel with and adjacent the arm upon which it is pivoted, cam means on the hub for retracting the lifting member during a portion of the rotation of the conveying means, gripping means mounted on the lifting member, for gripping a plant adjacent the severing blades, trip means on the gripping means causing the gripping means to close and the engaging member on the reciprocating arm to depress each time the trip means strikes a standing stalk, release means on the frame actuated by the movement of the base plate releasing the conveying means, connections from the crank arm connection whereby the conveying means may be intermittently operated each time said release means is actuated, hanger means suspended from the frame in spaced apart relation to the circumference of the circle made by the rotating gripping means, stapling means on the frame securing the plant on the hanger means, said stapling means including a staple container adapted to feed staples to a point adjacent the hanger means, drive means on the end of the staple container for driving a staple from the container to pass over the hanger means into a plant butt held in the gripping means, said drive means being connected

to an arm rotatable on a crank shaft journaled on the frame, a second rotatable means on the frame adjacent the hanger means rotatably the plant from the gripping means after the plant is inserted into the plant hook, said second rotatable means being connected to an arm on the rotatable crank shaft at a position about 90° behind the drive means arm, trip means pivoted on the frame and lying in the path of the rotating conveying arms, clutch means actuated by the trip means to connect the crank shaft to a rotating drive shaft each time an arm strikes the trip means, said drive shaft being journaled on the frame in the line of the crank shaft and connections between

the power source and the crank arm connections of the reciprocating arm whereby the drive shaft may be rotated.

CLYDE L. SOWERS.

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The following references are of record in the file of this patent:

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Number	Name	Date
1,124,181	Cook	Apr. 6, 1915
2,477,968	La Motte	July 26, 1949

Certificate of Correction

Patent No. 2,564,614 August 14, 1951

CLYDE L. SOWERS

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows:

Column 9, line 50, for "conveyings" read *conveying*; column 11, line 38, for "connectig" read *connecting*; line 39, for "staplig" read *stapling*; column 13, line 40, for "beings" read *being*; line 57, for "but" read *butt*;

and that the said Letters Patent should be read as corrected above, so that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 20th day of November, A. D. 1951.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.

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TOBACCO HARVESTER

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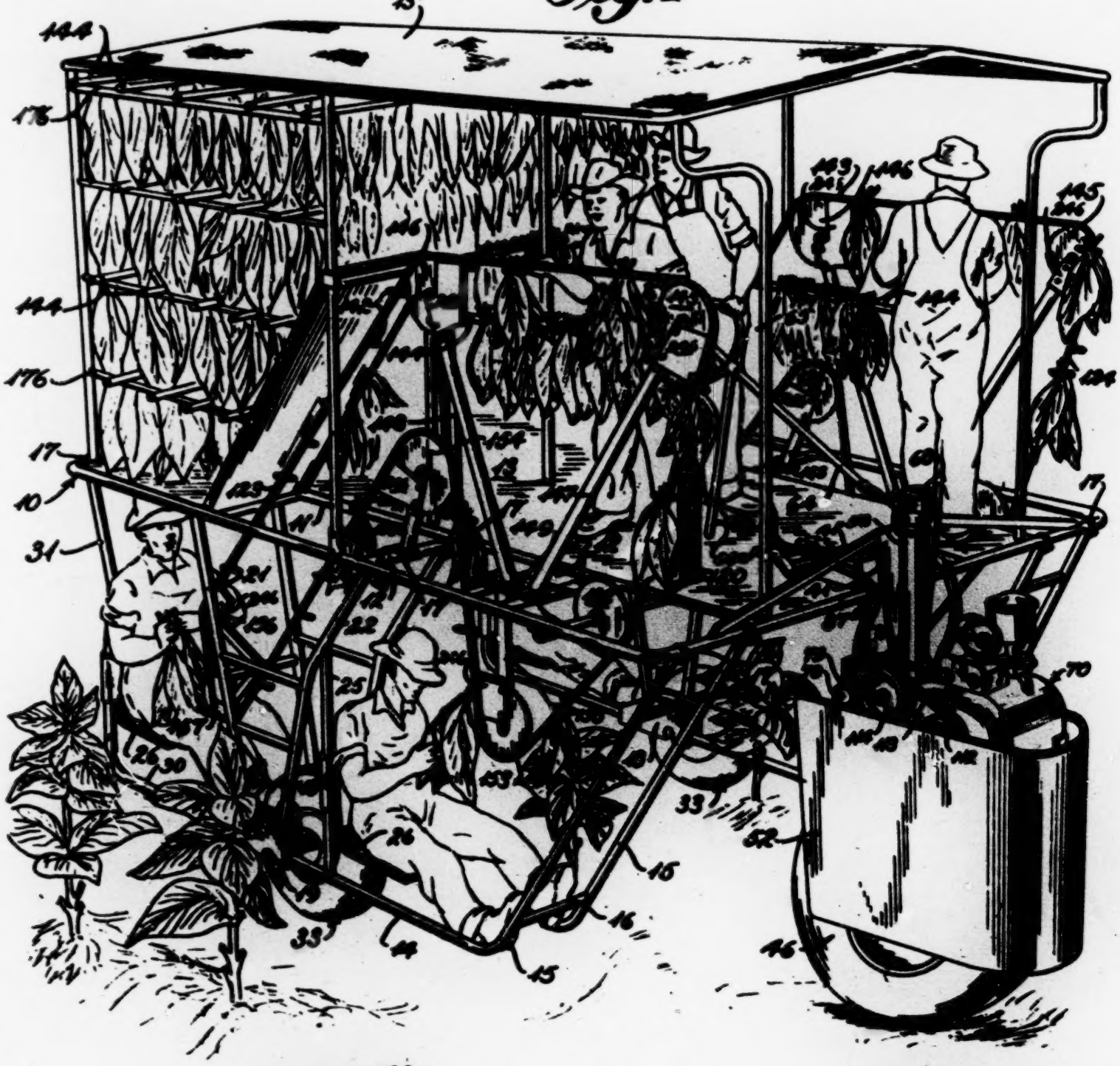
Fig. 1



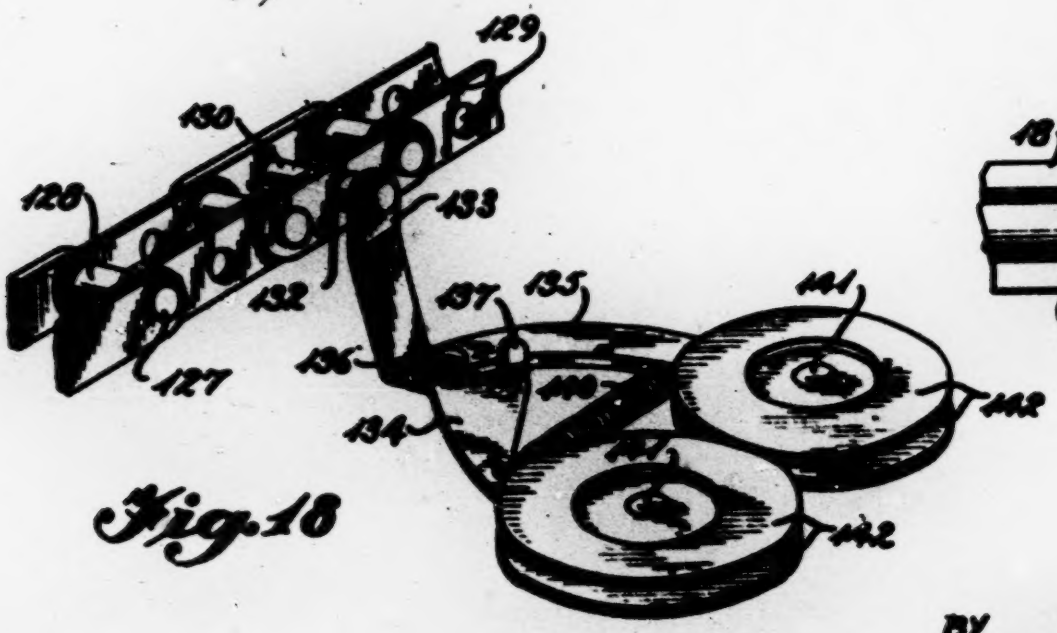


Fig. 18

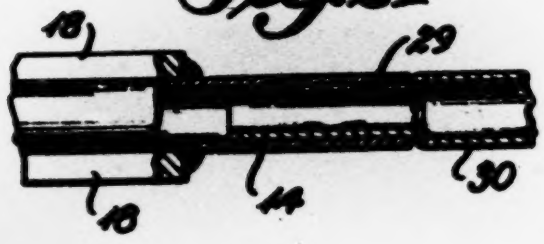


Fig. 21

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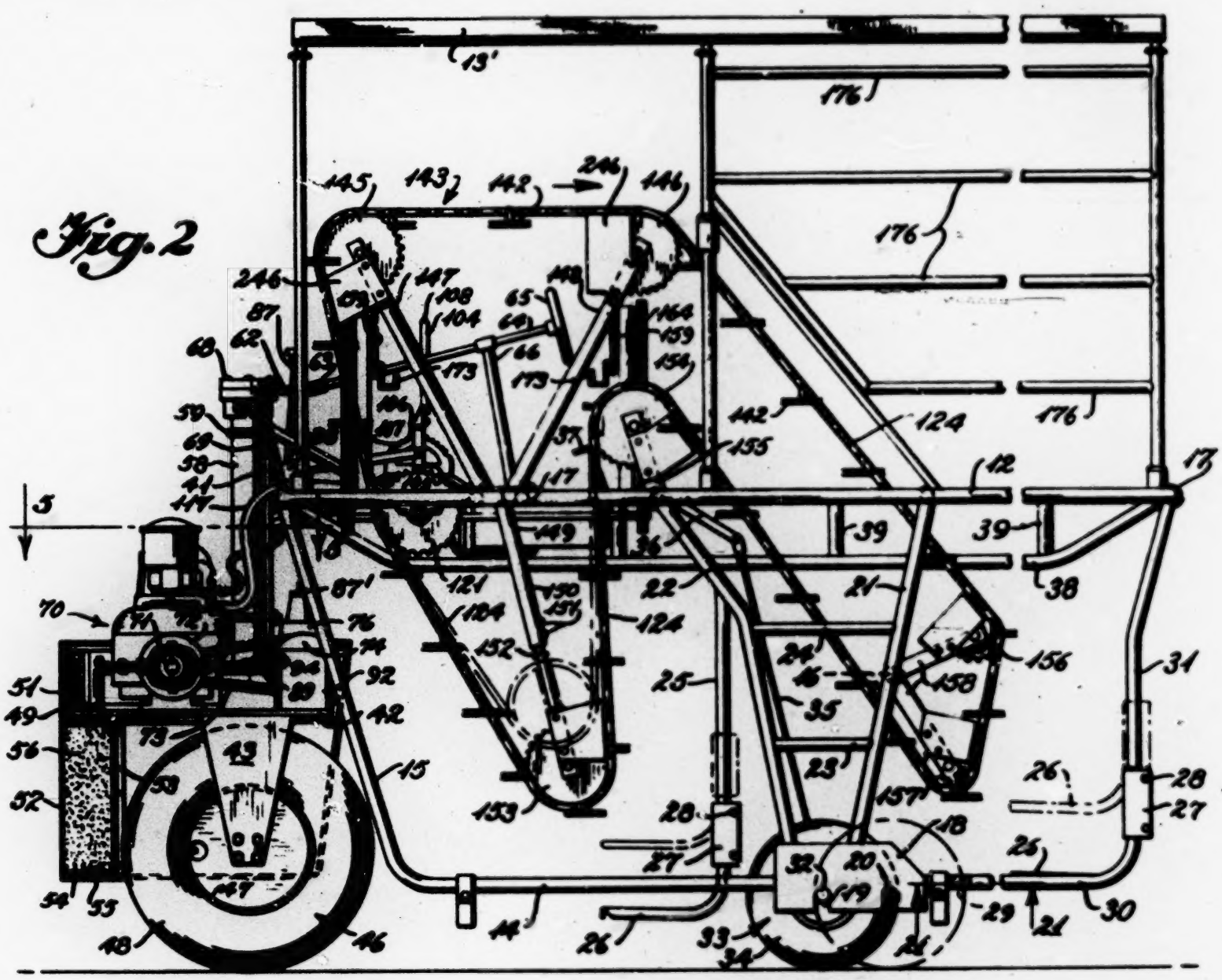
Fig. 2



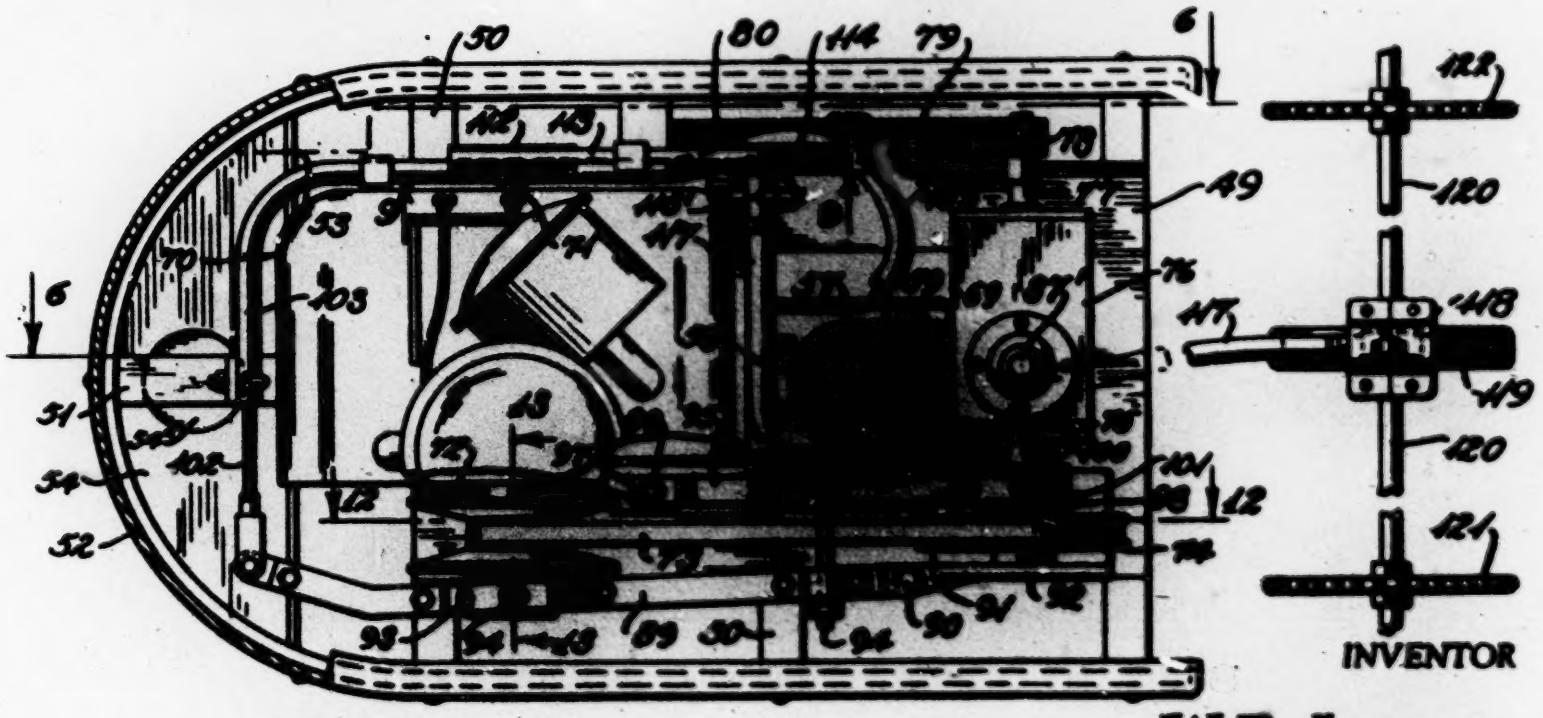


Fig. 5

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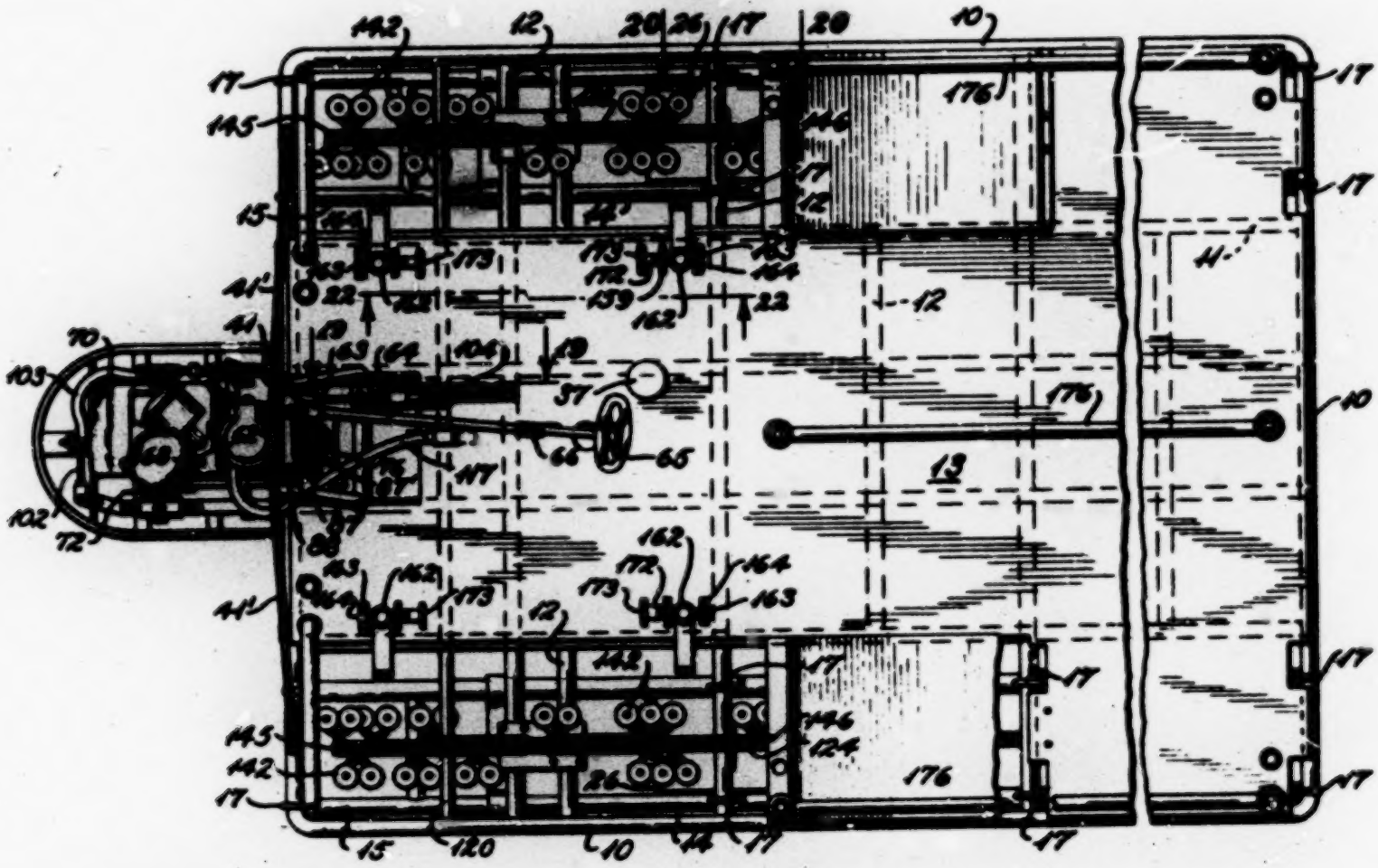
Fig. 3



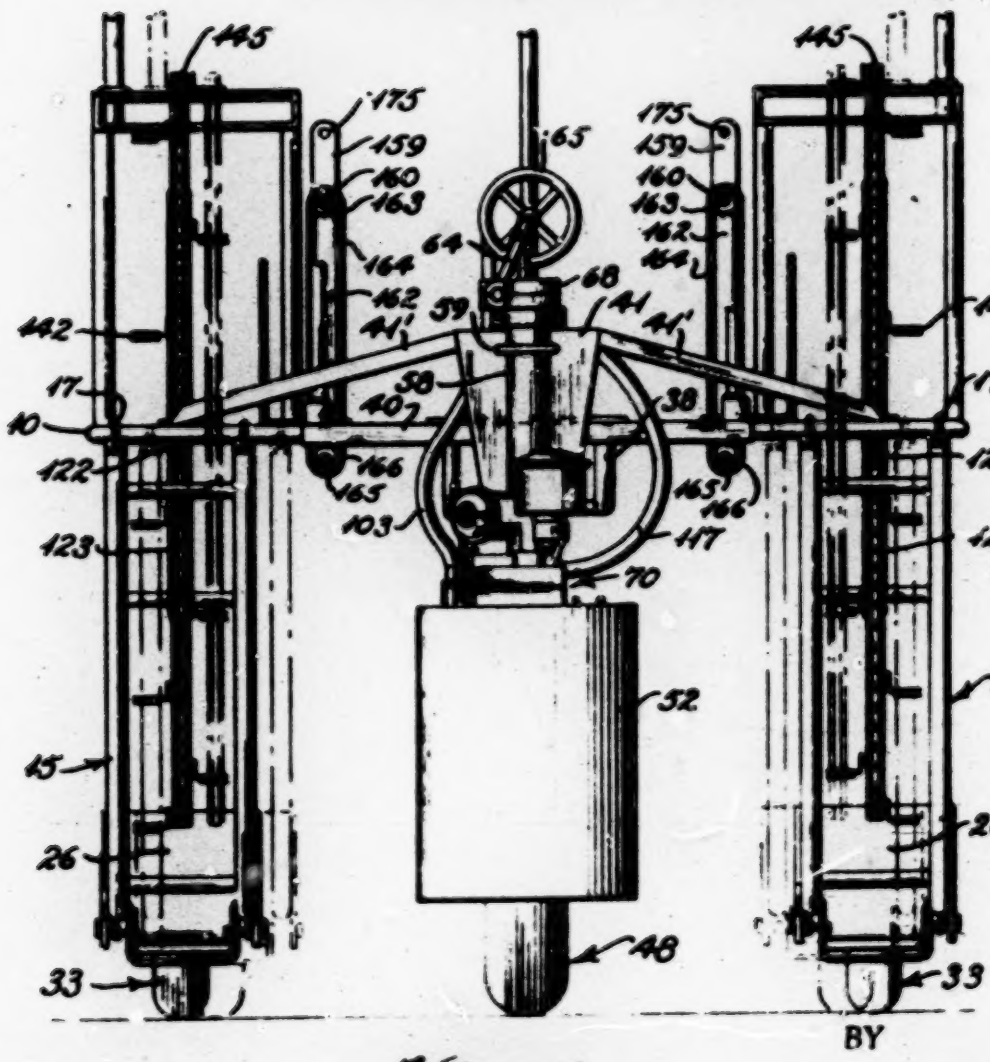


Fig. 4

Fig. 10

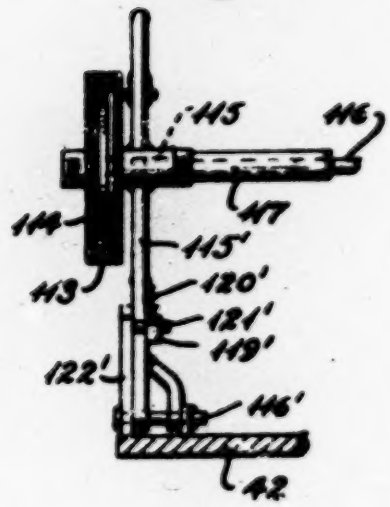


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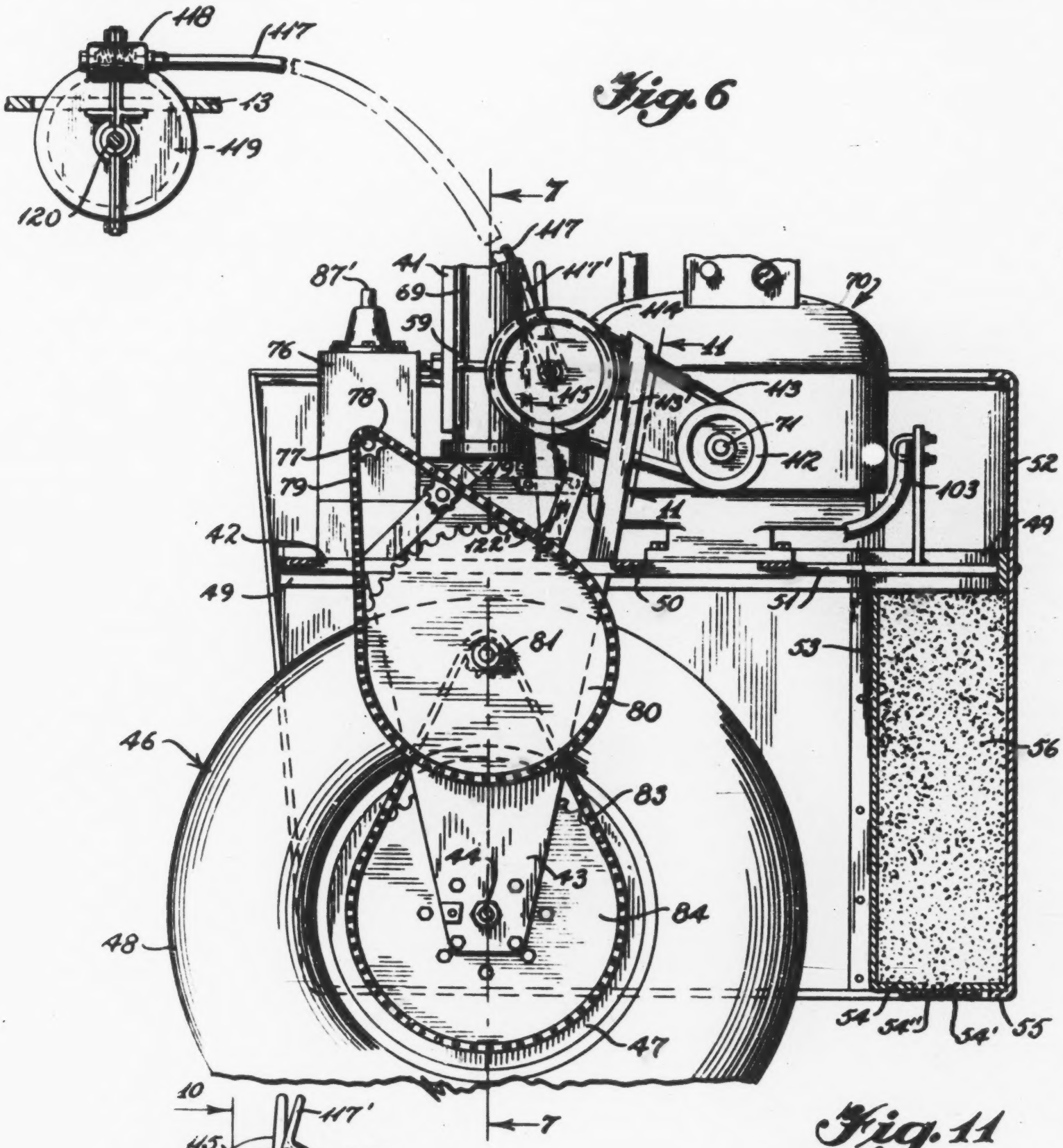
Fig. 6



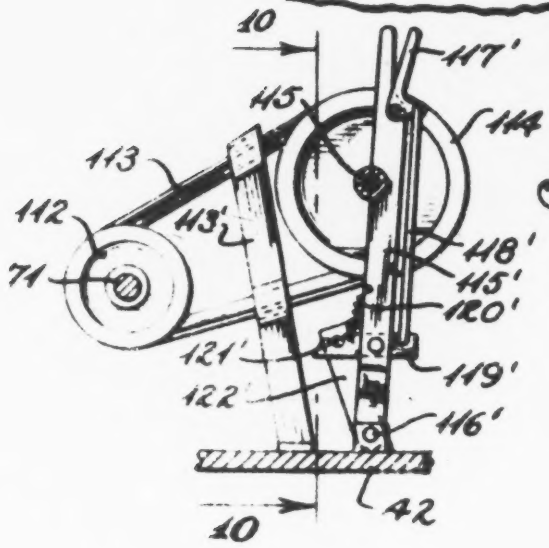
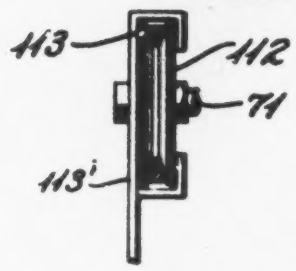


Fig. 9

Fig. 11



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March 15, 1955 W. R. LONG 2,704,158

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Fig. 7

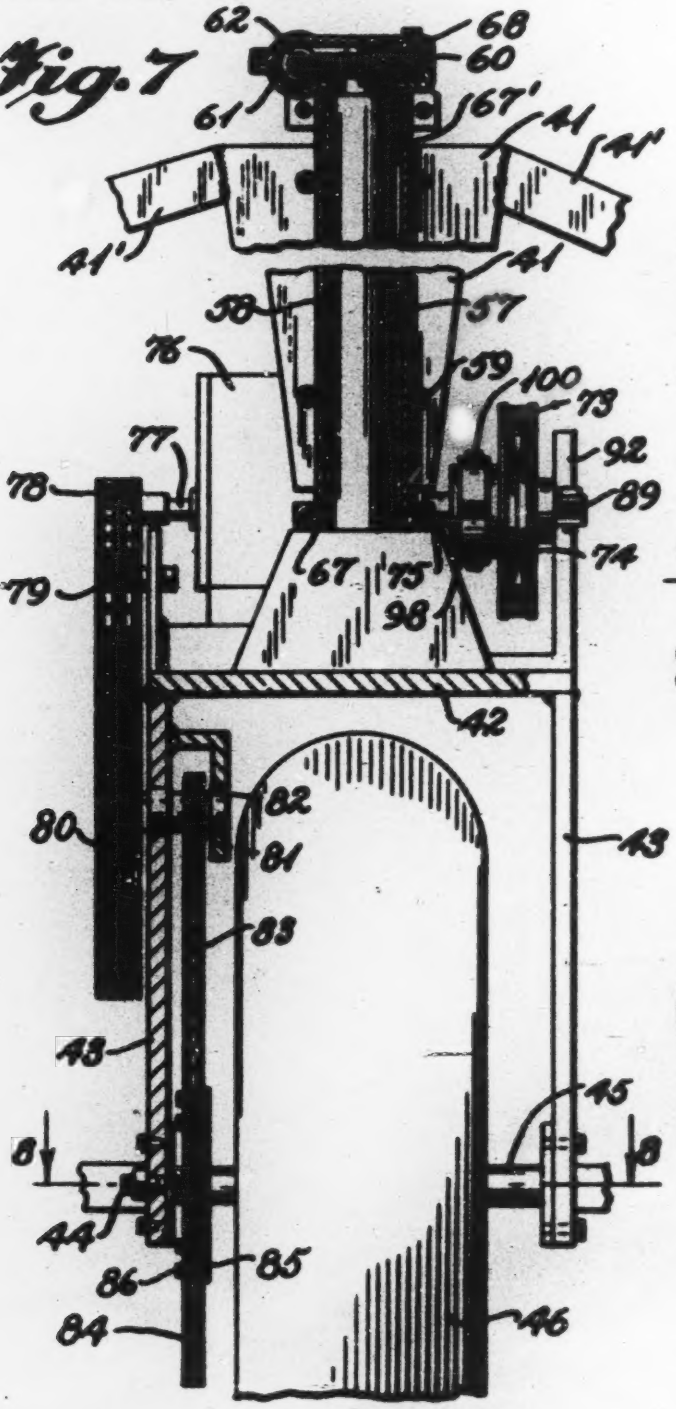

Fig. 8

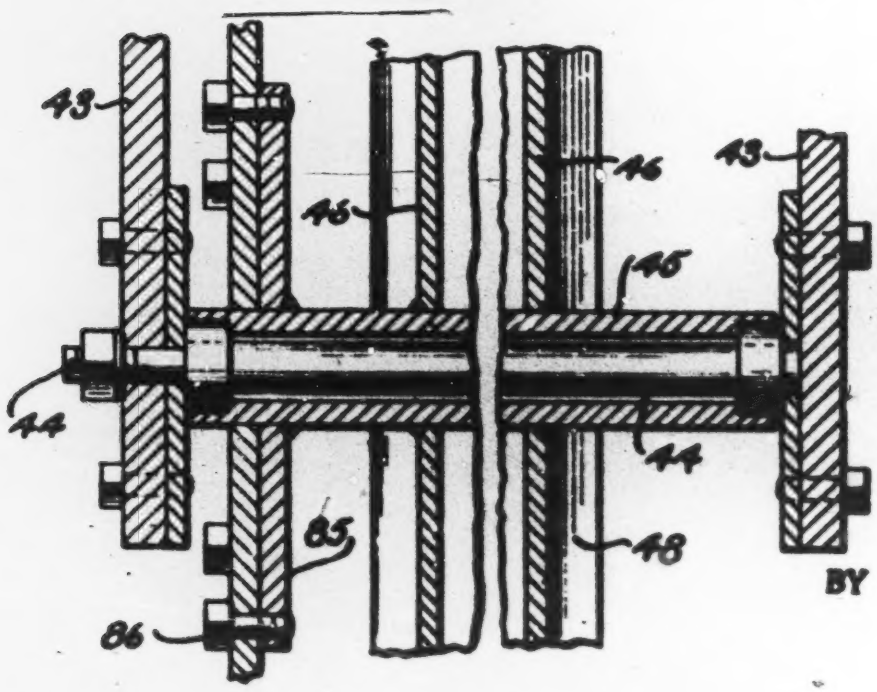

Fig. 15

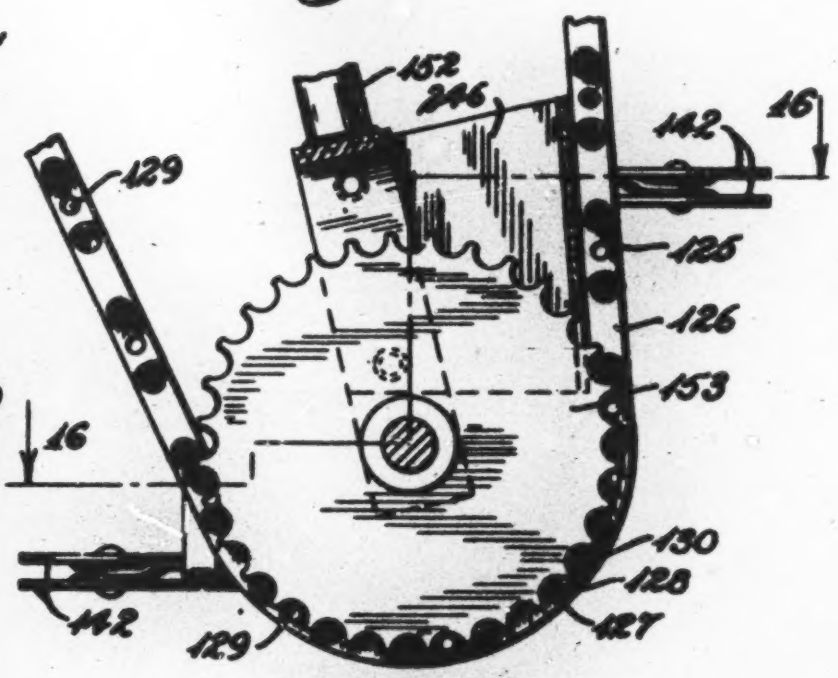

Fig. 16

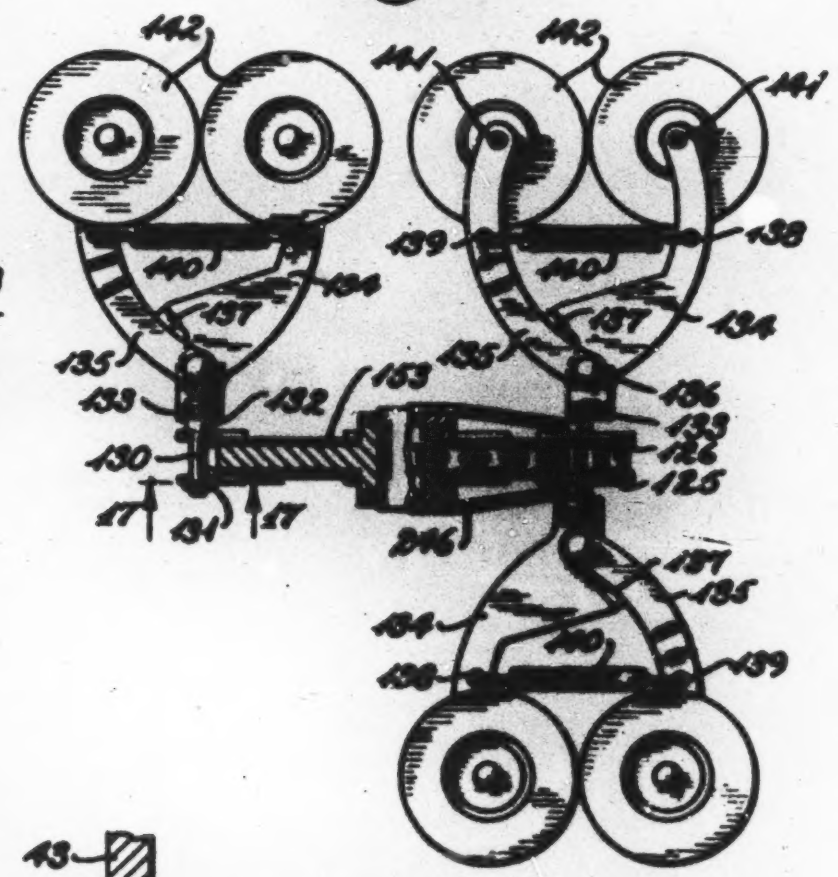

Fig. 17

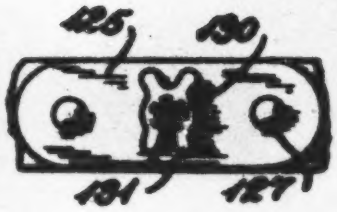

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Fig. 12

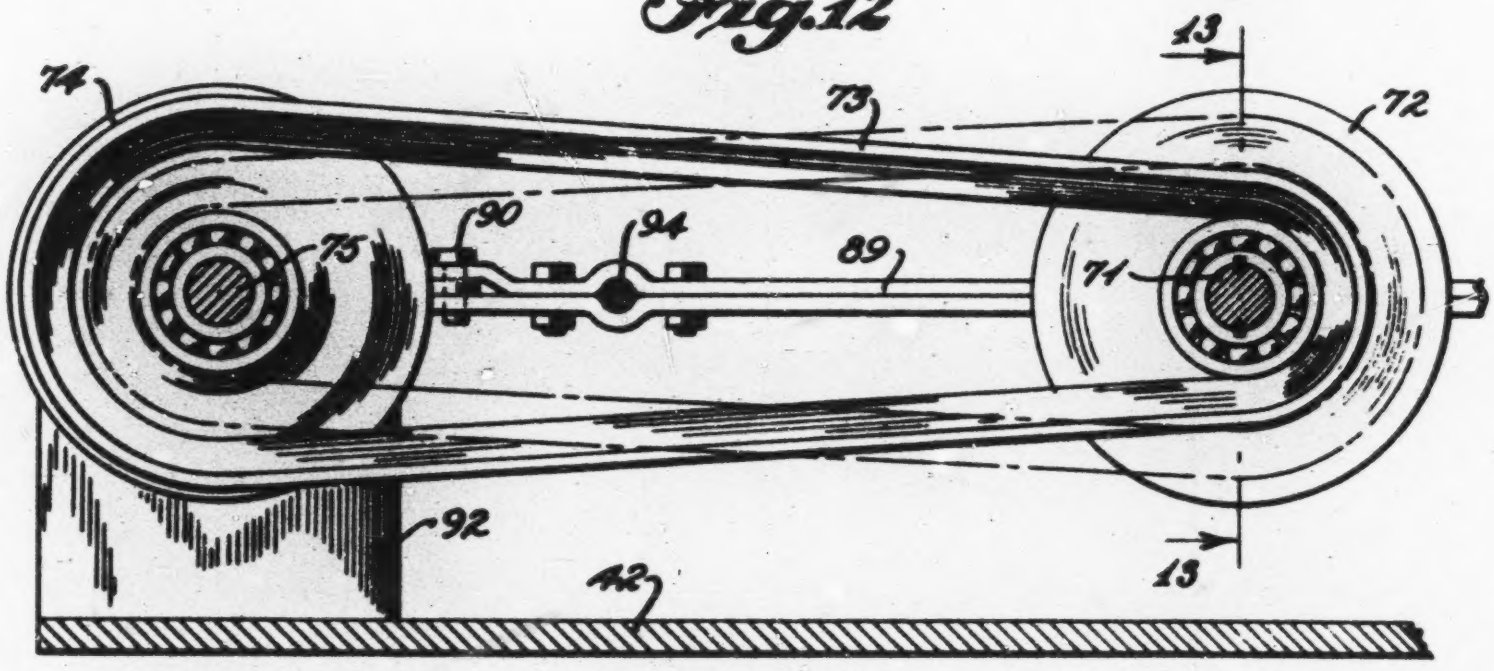

Fig. 13

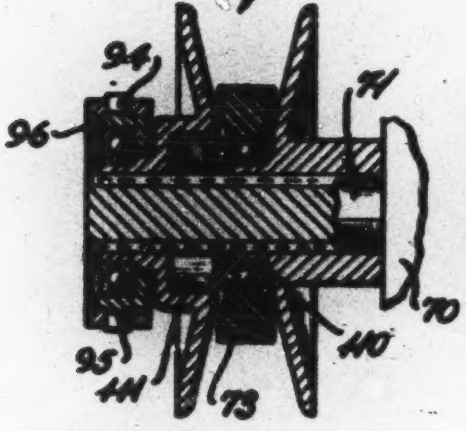

Fig. 14

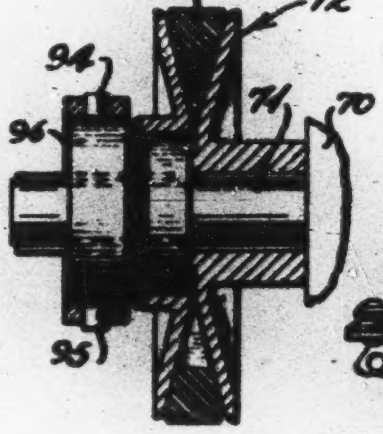

Fig. 20

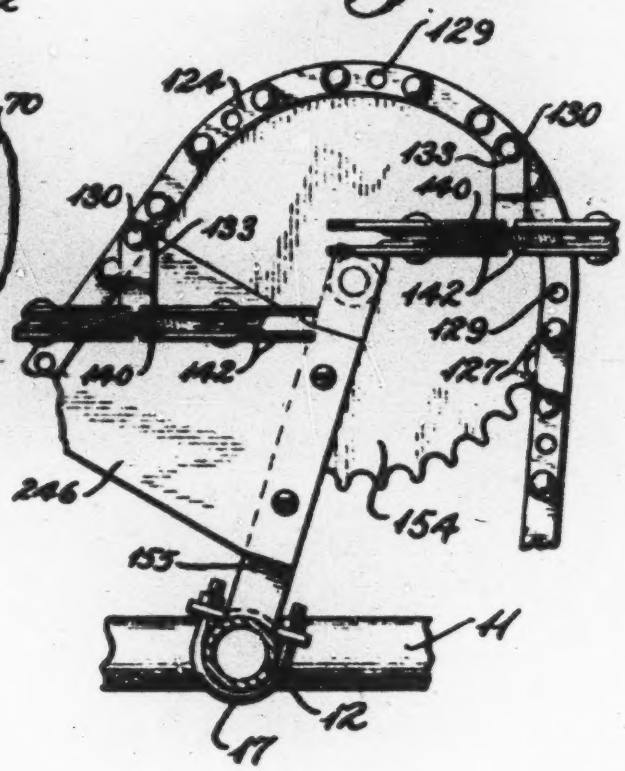

Fig. 19

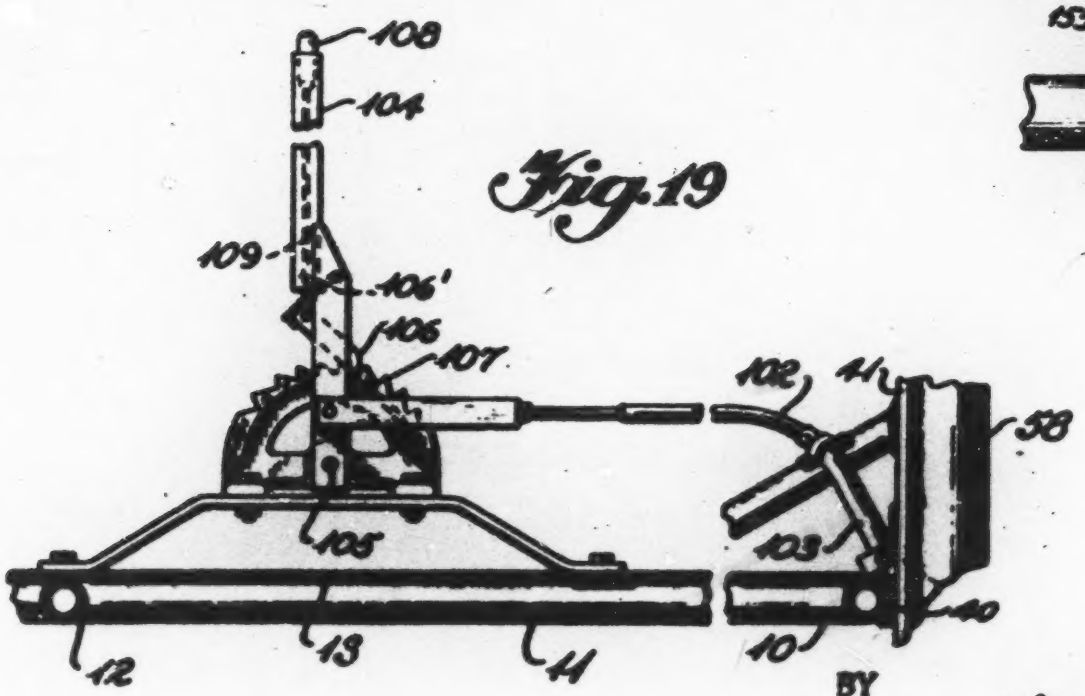

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Fig. 22

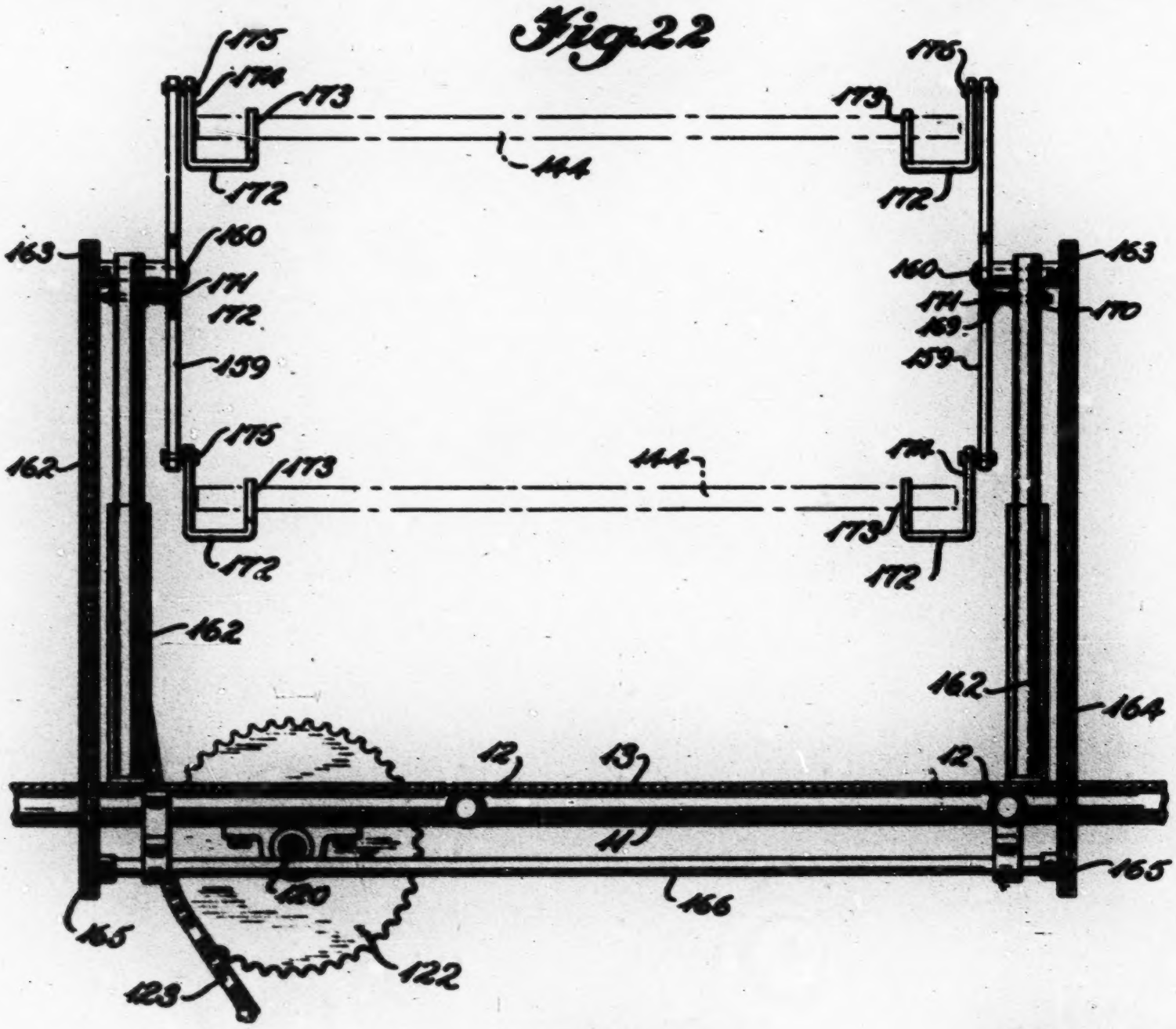

Fig. 24

Fig. 25

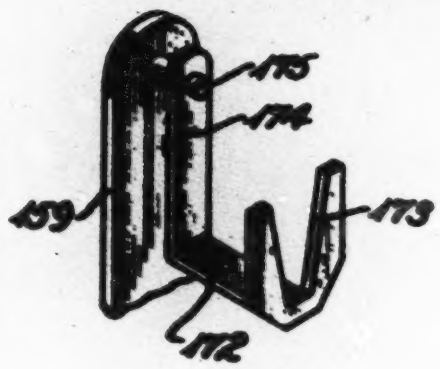

Fig. 23

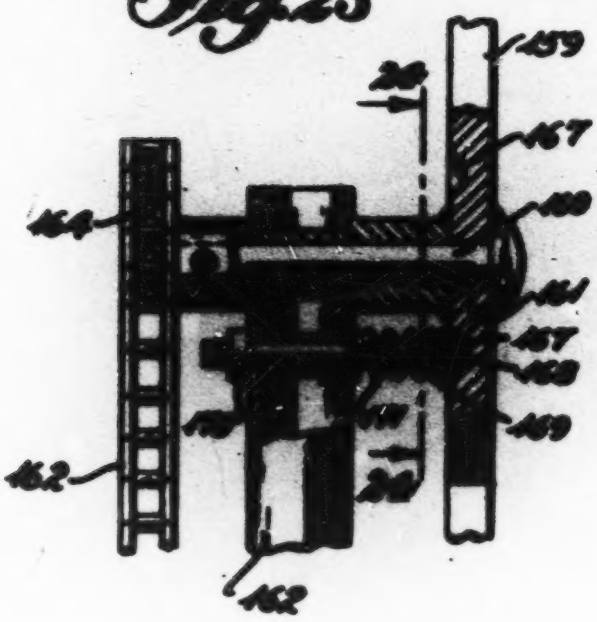

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Fig. 26

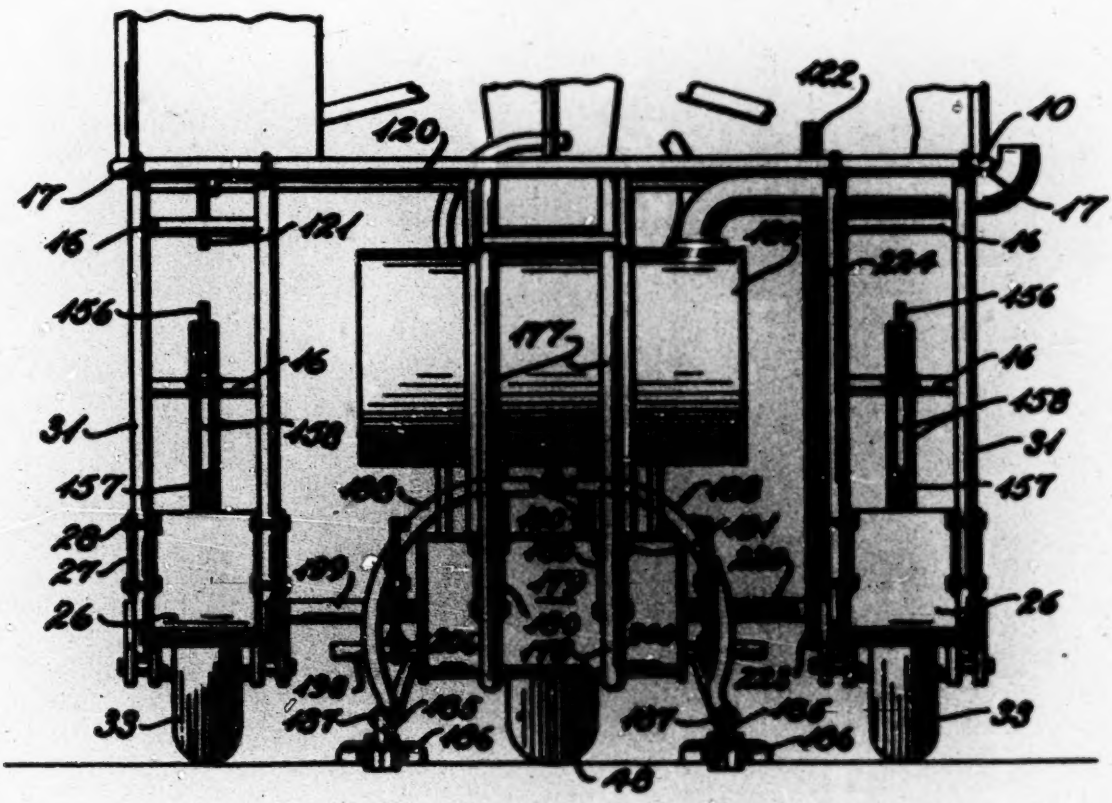

Fig. 27

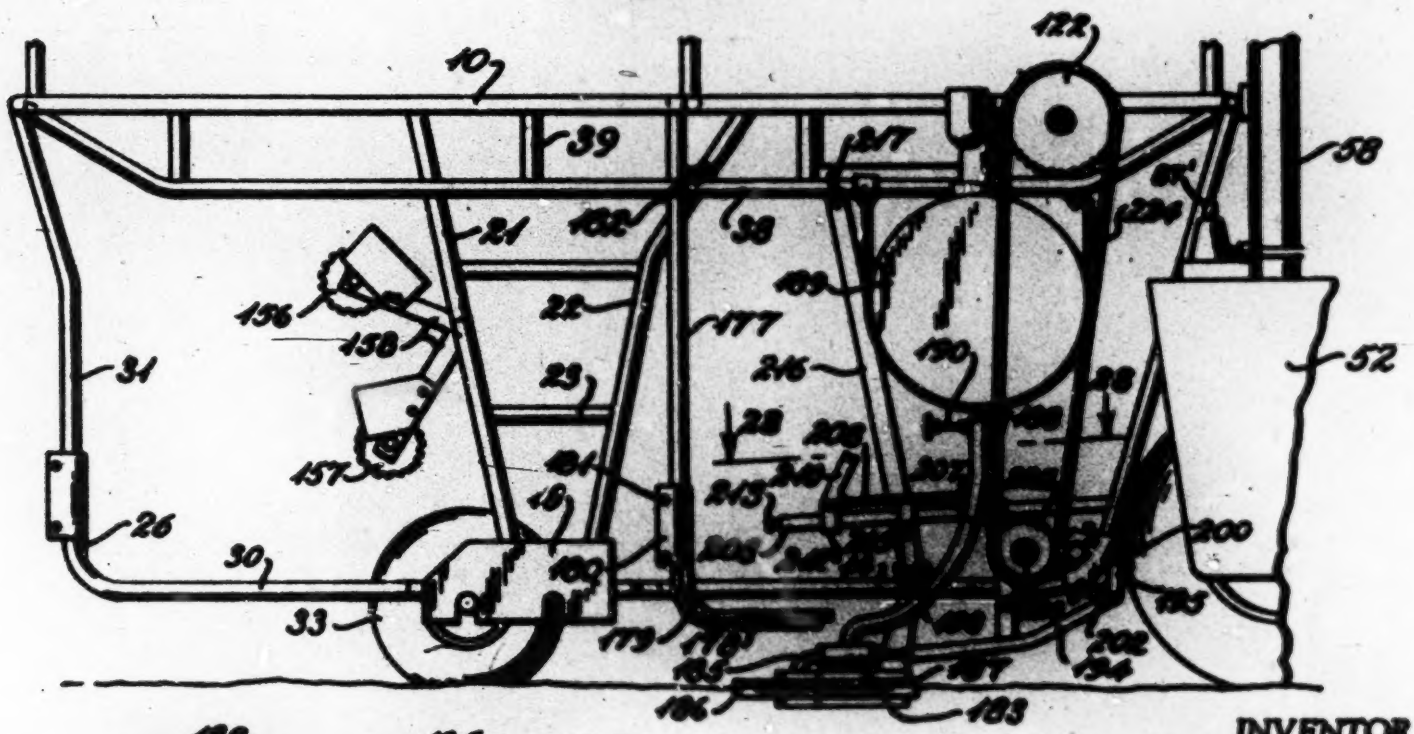

Fig. 30

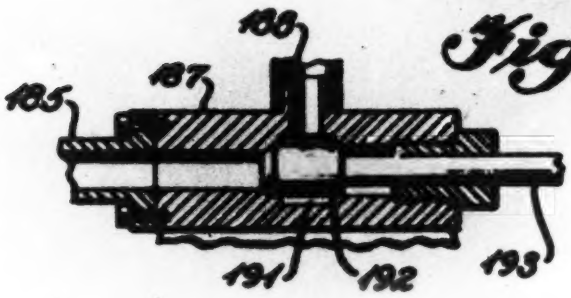

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Fig. 28

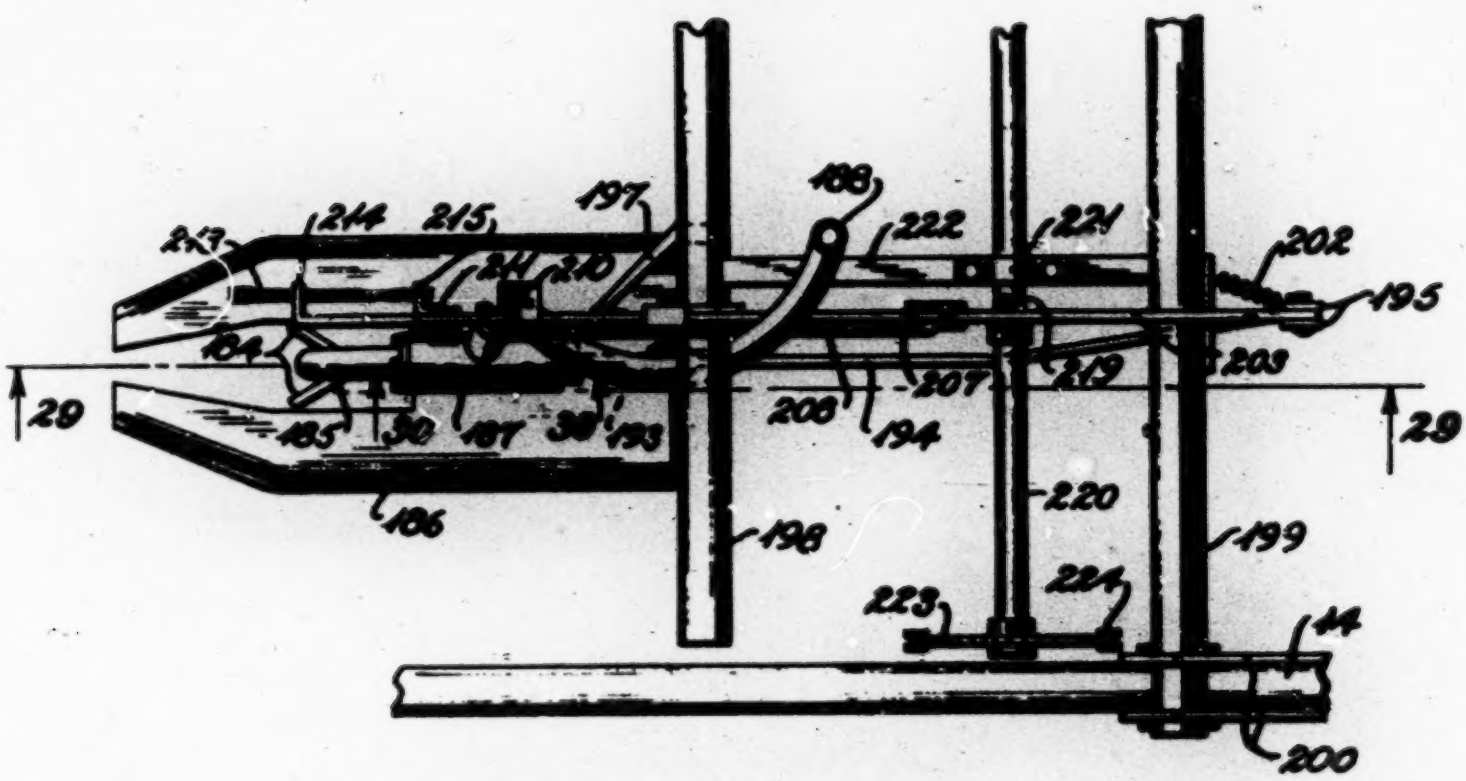

Fig. 29

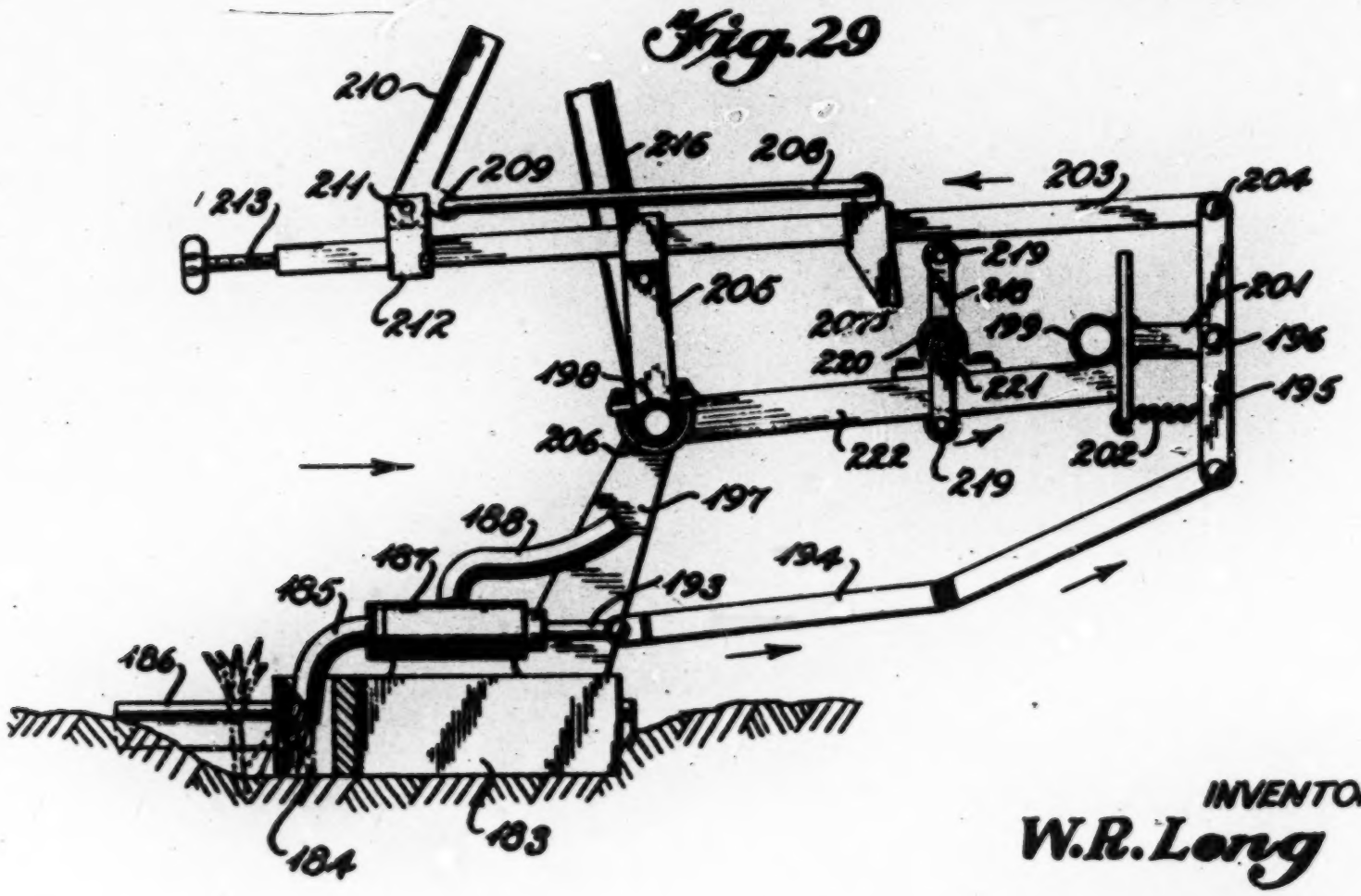

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Fig. 31

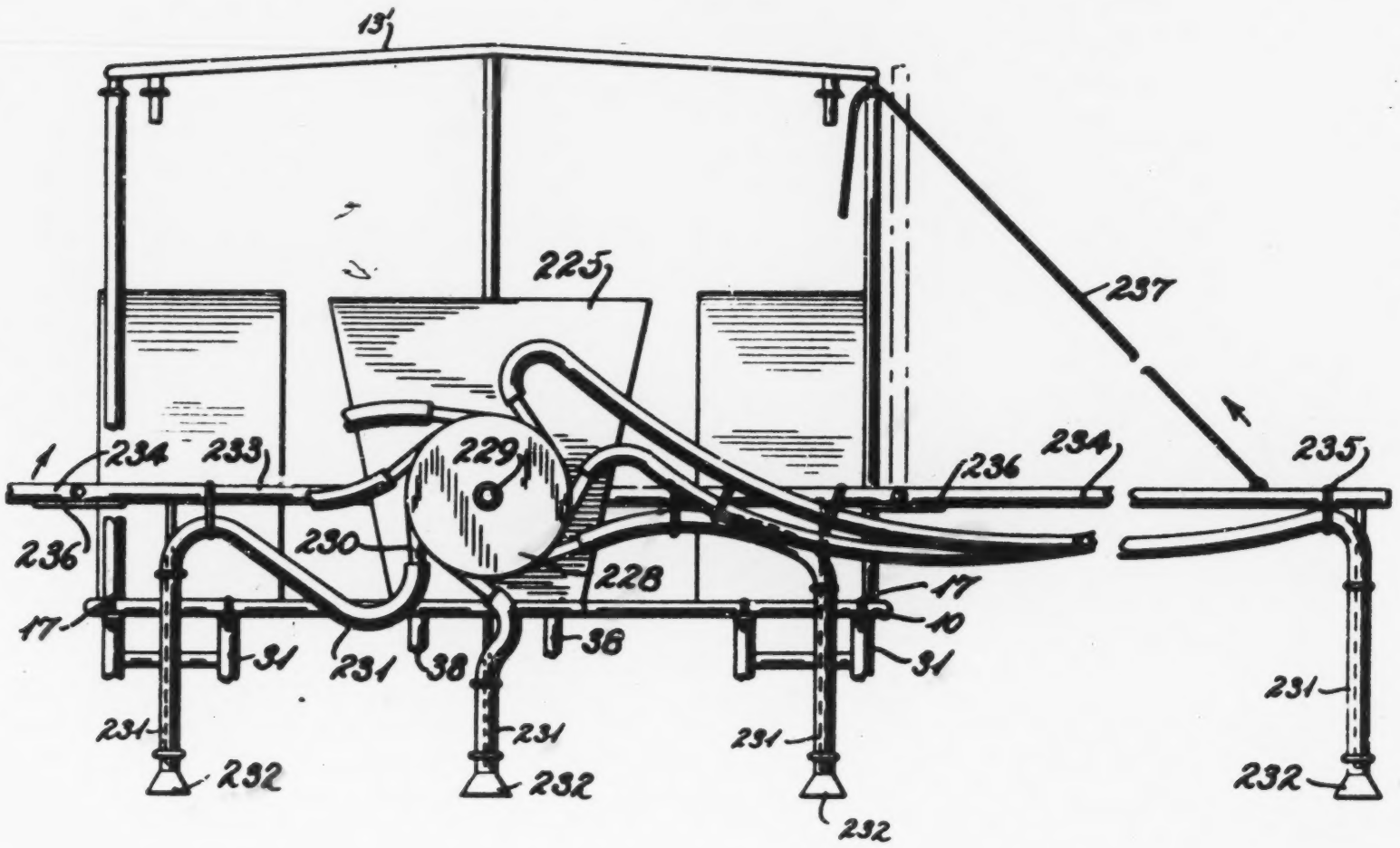
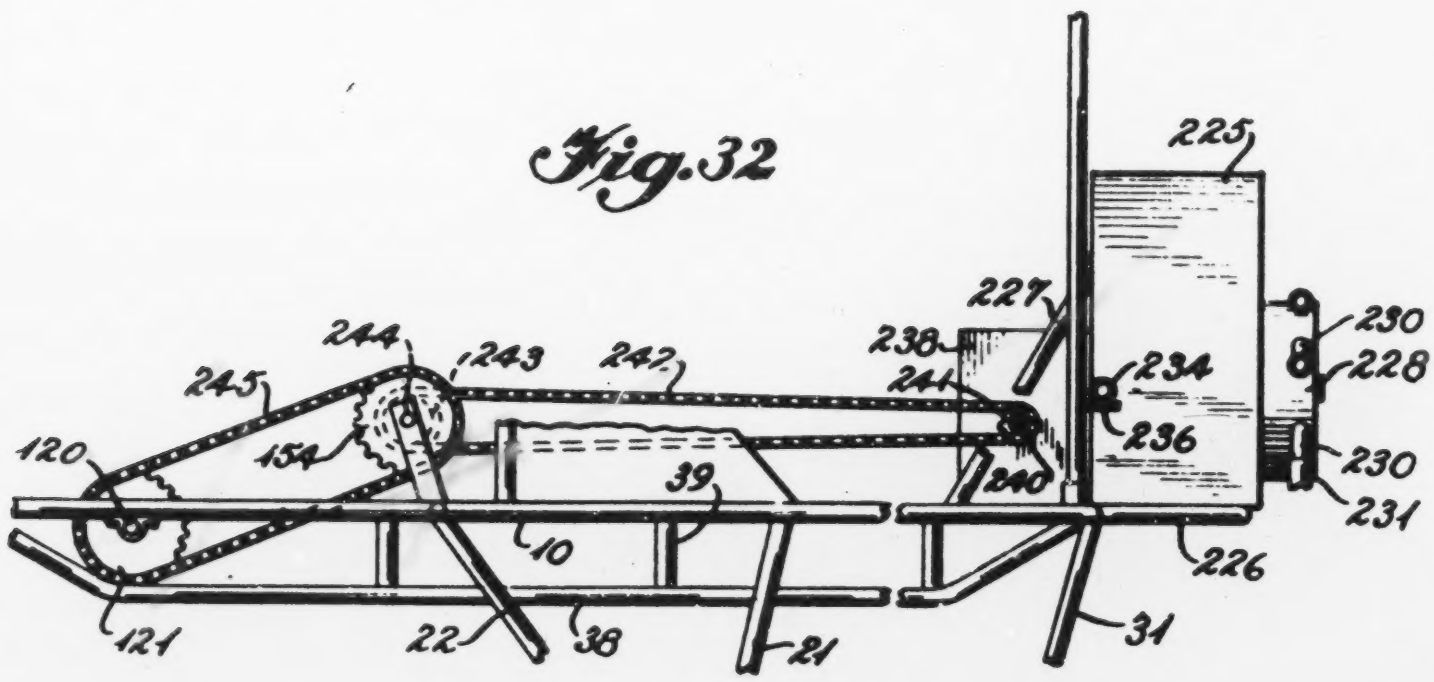


Fig. 32



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TOBACCO HARVESTER

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Application July 28, 1954, Serial No. 446,291

8 Claims. (Cl. 214—5.5)

This invention relates to the treatment of the soil including the planting, transplanting, cultivating, spraying, dusting and harvesting of tobacco and other products where the amount of labor and time consumed are important and influence to a great degree the acreage cultivated as well as the cost of the harvested product and the manufactured end product.

The labor and time required for the cultivating, harvesting, and caring for certain crops has presented such a problem that the farmer has had to limit materially the planting of these crops, such as tobacco, and particularly since prices, including those paid for wages to farm hands, have increased greatly.

Frequently crops such as tobacco ripen rapidly making it necessary to harvest the same in a comparatively short time in order to obtain a yield of the highest quality. This has required a large number of laborers in the planting, cultivating, and harvesting processes and where it has been necessary to spray the growing plants with powder or liquid the burden has been proportionately greater.

Not only has work involved required time and effort but among other things has been tiresome, backbreaking, and expensive. Transplanting has required a great amount of labor and frequently has been done by hand. In cultivating crops it has been necessary for persons to walk along the rows and perform certain tasks such as removing suckers from the stalks of growing plants and sometimes leaves touching the ground or which are unprotected as when cultivating tobacco.

When leaves of tobacco have matured and ripened it is necessary that they be pulled or removed from the stalks. In certain sections as for example in the southern part of the United States the lower leaves of tobacco ripen first and are removed in their prime condition by persons who are referred to as primers. The gathering or harvesting of the tobacco is usually accomplished by having a mule or horse pull a tobacco truck with a stake body and retaining burlap along and between rows of tobacco with a driver and two workmen or primers who walk between adjacent rows one primer at each side of the truck and the ripe leaves from two rows of tobacco are pulled from the stalks and placed on the truck. It then has been necessary to transport the tobacco to the barn for curing, the leaves being tied on sticks to facilitate handling and suspension between rafters during curing. The entire process has been slow, tiresome, laborious, and expensive.

Attempts have been made to provide machines for use in tobacco harvesting which would reduce to a substantial degree the labor and expense involved. These have not been satisfactory because they were too complicated, they failed to efficiently perform the service for which they were created, and were too expensive, as well as objectionable for other reasons.

It is an object of the invention to provide a practical, relatively inexpensive, durable, self-propelled machine, capable of being used in a number of ways on the farm including in the transplanting, cultivating, including spraying or dusting, and harvesting of tobacco and other crops, and by the use of which a greater amount of work can be accomplished with less labor and with less fatigue and effort on the part of the workman, and with which women as well as men may be used in the numerous operations due to the reduction in the strenuousness of the work made possible by the use of the machine.

Another object of the invention is to provide a self-propelled machine which can be adjusted longitudinally for use on either level or hilly soil to change the weight on the traction wheel, in which the other wheels can be adjusted transversely to conform to the different widths or spacings of the rows in which the speed of the machine can be controlled in accordance with the work performed and the density or sparcity of the product planted, cultivated, or harvested, as well as a machine which will travel without being steered from one end of a row to the other end, thus permitting the driver to perform other operations during the traversing of the rows, as for example during the harvesting process, such as placing sticks on which the leaves of tobacco have been strung on the storage racks of the vehicle for subsequent removal for transportation to a barn for curing.

Another object of the invention is to provide a machine of the character specified having endless conveyors at each side of the machine with portions located to facilitate loading convenient to seats for workmen along the lower portions of the sides of the machine and with upper substantially horizontal runs along the upper portion of the machine convenient to workmen on a platform in the upper part of the machine to permit the removal of the tobacco from the conveyors as well as a rotatable rack for sticks onto which tobacco can be readily tied while the leaves are retained in a pendant position and the filled sticks removed and placed in storage racks.

A further object of the invention is to provide a machine which can be used in the performance of numerous tasks on the farm including the spraying of crops and the like.

Another object of the invention is to provide a machine of the character indicated driven from an engine or power plant from which the conveyors likewise are driven, such power plant being set to operate at a desired constant speed and the conveyors operated at a constant speed but with a driving mechanism for the machine variable to change the speed of travel of the machine to suit the requirements.

A still further object of the invention is to provide a machine of the character described in which seats for workmen can be adjusted vertically to suit conditions, as well as a machine which can be rapidly produced, easily shipped, and quickly assembled and put into operation.

Other objects and advantages will become apparent from the following description taken in conjunction with the accompanying drawings wherein:

Fig. 1 is a perspective illustrating one application of the invention and its use in the harvesting of tobacco;

Fig. 2, a side elevation;

Fig. 3, a top plan view with the canopy removed;

Fig. 4, a front elevation of the lower portion of the machine with the canopy removed;

Fig. 5, a section on the line 5—5 of Fig. 2;

Fig. 6, an enlarged fragmentary section on the line 6—6 of Fig. 5;

Fif. 7, a section on the line 7—7 of Fig. 6;

Fig. 8, an enlarged fragmentary section on the line 8—8 of Fig. 7;

Fig. 9, a fragmentary section on the line 9—9 of Fig. 5;

Fig. 10, a section on the line 10—10 of Fig. 9;

Fig. 11, a section on the line 11—11 of Fig. 6;

Fig. 12, a section on the line 12—12 of Fig. 5;

Fig. 13, a section on the line 13—13 of Fig. 5;

Fig. 14, a fragmentary section of the drive pulley in its closed or high-speed driving position;

Fig. 15, a section on the line 15—15 of Fig. 4;

Fig. 16, a fragmentary section on the line 16—16 of Fig. 5;

Fig. 17, an enlarged detail on the line 17—17 of Fig. 16;

Fig. 18, an enlarged perspective of the tobacco gripping clamp or clip and a fragment of the chain from which it is suspended;

Fig. 19, a side elevation of the control lever taken on the lines 19—19 of Fig. 3;

Fig. 20, a fragmentary detail taken on the lines 20—20 of Fig. 3;

Fig. 21, a fragmentary section taken on the line 21—21 of Fig. 2;

Fig. 22, a fragmentary section on the line 22—22 of Fig. 3;

Fig. 23, an enlarged detail of the rack locking means of Fig. 22;

Fig. 24, a section on the line 24—24 of Fig. 23;

Fig. 25, a perspective of one of the stick-holding members of Fig. 22;

Fig. 26, a rear elevation of the machine equipped with a transplanter;

Fig. 27, a side elevation with parts broken away to reveal the transplanter of Fig. 26;

Fig. 28, a horizontal section on line 28—28 of Fig. 27 disclosing one of the transplanting and water feeding units;

Fig. 29, an enlarged detail of the transplanter taken on the line 29—29 of Fig. 28;

Fig. 30, a longitudinal section through one of the water valves of the transplanter;

Fig. 31, a fragmentary rear elevation of the upper part of the machine equipped with a plant dusting system; and

Fig. 32, a schematic side elevation illustrating the driving means for the duster of Fig. 31.

With continued reference to the drawings, the machine of the present invention comprises a rectangular frame 10 including longitudinal and transverse members 11 and 12 comprising a support or floor 13 providing a platform for workmen. A canopy 13' may be provided to cover the platform 13 to shield the workmen from the weather. The members 10, 11 and 12 are preferably of tubing and the frame with its platform is supported by auxiliary frames including a pair of spaced horizontal members or bars 14 having upwardly inclined forward portions 15 connected by a pair of transverse bars 16. The auxiliary frames are connected to the main frame by means of U-clamps 17 at their upper ends.

The spaced parallel horizontal tubular members 14 each are provided with a pair of spaced plates 18 clamped on opposite sides of each tubular bar 14, such plates having axle-receiving sockets 19 and 20.

Extending between the plates 18 and connected to the main frame are a pair of upright supports 21 and 22, connected by braces 23 and 24, the upper ends of which braces 21 and 22 are connected by the U-clamps 17 with the transverse members 12 of the main frame and afford adjustment laterally of the machine to correspond to the spacing of the rows along which the machine is operated.

The brace 22 is bent slightly relative to its lower portion and has welded or otherwise attached thereto and to the auxiliary frame member 14 an additional brace thus adding rigidity to the structure and providing a support on which seats 26 are adjustably secured by means of clamping sleeves 27 and bolts 28.

The tubular auxiliary frame members 14 terminate a short distance beyond the rear ends of the plates 18 and serve to receive the ends 29 of extension members 30 (Figs. 2 and 21) having upstanding portions 31 which connect by U-clamps 17 to the rear of the frame 10 and on which they can be adjusted as previously indicated. A second seat 26 is adjustable on the upright 31 of each auxiliary frame.

In order to support the main frame toward its rear an axle 32 is disposed transversely of the auxiliary frame in the sockets 19 in the plates 18 and on the axle 32 is mounted a wheel 33 having a pneumatic tire 34 thereon. A wheel 33 is disposed at each side of the vehicle and is provided with a conventional mechanical brake controlled by a link 36 operated by a conventional foot pedal 37. These brakes may be used particularly when the machine is being operated along a highway in moving from place to place.

The frame may be provided with a pair of spaced parallel reinforcing bars 38 (Fig. 2) connected by struts 39 to the under side of the frame. On the front of the main frame, welded or otherwise secured, is a reinforcing bar 40 and to this is attached a triangular plate 41 reinforced at its upper end by braces 41'. The plate 41 is welded or otherwise secured to the bar 40 and frame 10. A horizontal platform 42 is provided having depending tapered side members 43 forming a fork within which is disposed an axle 44 on which a housing 45 of a wheel is supported, such wheel including plates 46 welded or otherwise secured to the housing and to a conventional rim 47 on which is mounted a relatively large pneumatic tire which may have a self-cleaning tread not shown. This wheel is employed to drive the machine.

Around the platform 42 is mounted a U-shaped frame (Figs. 5 and 6) rounded at its forward end and with straight side portions 49 extending rearwardly therefrom and connected by side straps 50 to the platform 42, and with a front bar 51 also connected to said platform. A casing or skirt 52 fits around the forward and side portions of the platform 42 and encloses the upper portion of the front and sides of the wheel and parts thereabove. Within the front of the skirt is mounted a plate 53 having a forwardly extending bottom 54 which rests upon and is connected to a lip 55 of the skirt 52 and provides a container for ballast of sand and or other material 56 in order to add weight to the wheel 46 by means of which the vehicle is driven. The container is provided with an opening 54' and a cover 54'' for drainage purposes.

The platform 42 has a post 57 welded thereto and located in a housing 58 secured by U-clamps 59 to the plate 41. At its upper end the steering post is provided with a gear 60 engaged by a worm 61 on a shaft 62 connected by a universal joint 63 with a steering post 64 having a steering wheel 65 on its upper end. A brace 66 is provided for supporting the steering post 64 from the frame of the machine. The housing 58 is supported at its lower end on the platform 42 by means of a thrust bearing 67 a bushing 67' being employed at its upper end. The worm 61 and gear 60 are provided with a conventional split housing 68. For additional strength and to prevent relative rotation of the housing 68 and its mounting a pair of vertical rods 69 are attached to the exterior of the housing in parallel relation and prevent rotation thereof (Fig. 5).

On the platform 42 above the driving wheel 46 is mounted an air-cooled motor 70 utilized to drive the wheel 46. The shaft 71 of the motor is located transversely of the machine and power is taken from the motor shaft at the left side (Fig. 5), drives a split pulley 72 having its near side fixed and its remote side adjustable to and from its near side for increasing the diameter of the pulley for driving with variable speed a belt 73 which drives a second split pulley 74 of similar diameter. The pulley 74 (Fig. 12) is mounted on a shaft 75 connected by transmission 76 with a shaft 77 having a double chain sprocket 78 which drives a double chain 79 which in turn drives a sprocket 80 of increased size and located on a shaft 81. A small sprocket 82 also mounted on the shaft 81 and drives by a heavier chain 83 a sprocket 84 secured to plate 85 by means of bolts 86. The plate 85 is welded or otherwise attached to the housing 45 for the axle 44 supported by wheel 46. Thus power from the motor is employed to drive the enlarged front or traction wheel of the vehicle. A removable gear shift lever 87 for lever 87' of the transmission 76 normally is kept in a receptacle 88 (Fig. 3) so that it will not be engaged and broken off during the turning of the vehicle through its radius of approximately 90°, permitting turning in smallest space for obvious reasons. The transmission 76 affords a plurality of forward speeds while the split pulleys 72 and 74 and the connecting V-belt 73 increase the variability of the speed of the vehicle or permit the vehicle to be stopped completely (Figs. 13 and 14). In order to operate the pulleys 72 and 74 to vary the diameter of each, bar type operating linkage is connected by a pivot 90 with a bracket 91 fixed to a fixed plate 92 and including a yoke 93 engaging opposite ends of a retainer 96 connected by a suitable bearing with the removable side of the pulley which is keyed on the shaft 71. When the yoke 93, which consists of upper and lower parts, is operated about the pivot 90 it carries the movable side of the pulley 72 with it. When the pulley 72 is moved toward open position it is desirable to move the pulley 74 toward closed position, consequently, a tension rod 94 is extended through the linkage 89 and through a second or additional linkage 95 between the side of which and the end of the bolt is disposed a compression spring 96 (Fig. 5).

The linkage 95 has its ends forming yokes with its end 97 receiving a fixed pivot 99 and its end 98 being its opposite end receiving a pivot 100 on the hub 101 of the movable side of the split pulley 74. The front end of the linkage 89 is connected to a flexible control cable 102 which extends through a sleeve 103 and connects to

a lever 104 mounted on a pivot 105 and having a suitable spring pressed pawl for engagement with a ratchet 107 (Fig. 19). The pawl 106 is controlled by a depressable button 108 through a linkage 109 secured to the outer end of the pawl 106 against the action of a spring 106'.

When the lever 104 is swung on its pivot 105 motion is imparted to the linkage 89 to open the pulley 72 and close the pulley 74 by operation of the bolt 94, and vice versa. The degree of opening of the pulleys varies the drive and the speed of the vehicle may be varied from a fraction of a mile to several miles per hour as well as completely stopped either by the operation of the split pulleys or by the transmission 76.

Each of the split pulleys is provided with a bearing so that when the belt reaches the same it will move freely and when the pulley 72 is open the harvester may idle. The movable side of the split pulley 72 is provided with a chamber 111 (Fig. 13) to accommodate the bearing 110 when the sections of the pulleys are brought together. The pulley 74 is of similar construction.

On the end of the motor shaft on which the split pulley 72 is mounted is fixed a pulley 112 which drives a belt 113 and a second pulley 114 (Fig. 6). The pulley 114 is supported on a shaft 115 connected to a flexible cable 116 and a housing 117. The shaft 115 on which the pulley 114 is mounted is carried by a lever 115' mounted on a pivot 116' on the base plate 42, such lever having a release lever 117' which, through a link 118' operates a latch 119' normally held by spring 120' in contact with pin 121' carried by a fixed brace 122 (Fig. 9). Thus, upon operation of the lever the pulley will be swung towards the pulley 112 releasing the belt 113. Guard 113' retains the belt ready for lateral operation. Release of the pulley 114 from the belt 113 likewise frees the flexible shaft 115. The flexible cable 116 extends rearwardly beneath the frame 10 and has attached thereto a worm 118 (Fig. 5) which engages a gear 119 on a shaft 120 disposed transversely of the machine and having sprockets 121 and 122 on each side of the machine by means of which conveyor chains 123 and 124 located at opposite sides of the machine are driven. Each conveyor chain is composed of a series of outside links 125 connected to inside links 126 connected by rivets 127 with spacing sleeves 128. The outside links 125 are provided with center openings 129 in certain of which are disposed mounting pins 130 secured in position by yoke fasteners at one end and with the opposite ends of the mounting pins extending into a sleeve 132 riveted into the upper end of an arm 133 (Figs. 17 and 18).

The lower end of the arm 133 is bent outwardly at right angles and forms one arm or side 134 of a fork or clip, and a second curved side 135 of such fork is secured by a pivot 136 to the base or inner portion of the arm 134. The arm 134 is provided with a lateral portion forming a step 137 for limiting the movement of the arms toward each other. The arms 134 and 135 are provided with openings 138 and 139 respectively in which the ends of a helical spring are engaged to cause the free ends of the arms to be moved toward each other. Between these arms or within the clip thus formed a plurality of stems of tobacco are adapted to be inserted so that they can be carried along by the conveyor and subsequently removed. To facilitate the operation of these arms they may have contiguous rounded portions and to prevent gumming, bolts or rivets 141 are provided in the ends of the arms on which are mounted two pairs of spaced disks 142, the disks of each pair being disposed in opposite sides of its supporting arm. By using disks which are freely rotatable, gum from tobacco will not accumulate sufficiently to interfere with the operation and does not have to be removed by scraping (Fig. 18).

The conveyor 124 is provided for carrying tobacco from a position near the ground to a higher elevation above the platforms and along an upper run 143 from which the tobacco can be removed and placed on sticks 144. Each conveyor has portions located adjacent the two seats 26 so that tobacco can be placed in the clips or holders by workmen seated on the seats at each side of the machine. In order to dispose the conveyors in the proper position for unloading each is mounted on upper sprockets 145 and 146 so that their upper edges are at the same level. These sprockets are mounted on a Y frame having legs 147 and 148, such Y frame being secured to a base plate 149 secured by U-bolts 17 to tubular cross members 12 and such Y-frame including a depending tube 150 having set screws 151 for engagement with the shank 152 of an adjustable tubular support for the sprocket 153 located near the front seat 26 (Fig. 2).

From the front end of its upper run 143 each conveyor extends downwardly around a driving sprocket by means of which it is driven. From the sprocket 153 the conveyor extends upwardly around a sprocket 154 carried by a bracket 155 which, like the other brackets, is adjustable and is secured to a cross member 12 by means of a U-clamp 17. From the sprocket 154 the conveyor has an inclination downwardly and rearwardly about sprockets 156 and 157 carried on opposite ends of the diverging arms of a bracket 158 which is rigidly mounted on a transverse tubular bar 16. Thus the conveyor extends around driving sprockets 121 and 122 up and over sprockets 145 and 146, down and around sprockets 156 and 157, up and over sprockets 154, down and around adjustable sprocket 153 and then again to the drive sprockets 121 and 122.

The clips with the disks 142 are disposed at spaced intervals alternately on opposite sides of the conveyors and convenient to the workmen or primers near the ground and so that the tobacco leaves from the four rows worked at one time will be uniformly spaced.

Tobacco removed from the upper runs of the conveyor is adapted to be placed on sticks 144 disposed longitudinally of the machine and resting on rotary supports. These supports comprise mounting bars 159 having central openings 160 for pivot pins 161 to which they are fixed, such pins being mounted in stanchions 162 mounted on the platform 13. The outer ends of the pivot pins 161 are provided with sprockets 163 which engage chains 164 and sprockets 165 on a common shaft 166. Thus the arms 159 are mounted and maintained in the same relation. In order to stop the mounting bars in a definite position they are provided with sockets 167 for the reception of the rounded heads 168 of locking pins 169 mounted in the stanchions 162, such pins being provided with adjusting nuts 170 for applying tension to the spring 171 which urges the rounded head 168 of the locking pin into the depression 167 in the arm 159 (Fig. 22).

In order to support tobacco sticks pairs of brackets 172 (Fig. 25) are provided each having a bifurcated end 173 in which the tobacco stick 144 can rest, said bracket also having an upstanding supporting arm 174 mounted on a pivot 175 in the arm 159. The arm 174 of the bracket 172 serves as an abutment against which the ends of the stick may engage. One of these brackets 172 is disposed at each end of the bar 159 and since the bars are in pairs one at each end of the tobacco stick, the stick may be removably supported in opposite positions on the rack. The stick in the uppermost position is adapted to have tobacco strung in depending position thereon and when filled pressure may be exerted to cause the head 168 of the locking pin to move from the socket 167 and permit the stick to swing downwardly with its ends held in opposed brackets whereupon an empty tobacco stick previously applied to the holders of the rack at the lower ends of the bars 159 will be brought into uppermost position where it can be loaded and the process repeated. When the filled sticks are removed they may be stored on racks 176 at the rear of the machine (Fig. 23).

The machine may be adapted for use in setting out or transplanting small plants, such as tobacco, grown in a hot bed until they reach a predetermined size after which they are transplanted. In order to equip the machine as a transplanter, a pair of L shaped supports 177 are provided having horizontal seat portions 178 for supporting a seat 179 fixed to said support by means of U-clamps 180 held together by bolts 181 (Figs. 26 and 27). The supports 177 are held by U-clamps 182 to braces 38 and are maintained in this fixed relation on account of the fact that the upper ends of the supports engage the transverse members 12. Two of the supports 177 are provided in spaced parallel relation.

The seat 178 is disposed centrally behind the front drive wheel and is of a length sufficient to support two workmen side by side but is short enough to pass freely between two rows. An additional workman can be accommodated in each of the seats 26 on the remote side of each of the rows.

The planter comprises a conventional earth displacing

plow or drill 183 having a pair of divergent portions 184 to open a furrow into which water is periodically and regularly discharged through a nozzle 185 and at the same time a plant is adapted to be inserted and the earth returned by converging wings or shoes 186 (Figs. 28 and 29).

Water through the nozzle 185 is controlled by a valve 187 (Fig. 30), such water being supplied through tube 188 from a container or tank 189, a control valve 190 being employed for shutting off the discharge of water from said tank.

The valve 187 includes a valve chamber 191 and a valve body 192 having a valve stem 193 reciprocated through linkage 194 and rocker arm 195 mounted on a pivot 196. The rocking of this arm will operate the valve 192 to open and close the same to permit water to flow therethrough.

The shoe or plow 183 is carried by an arm 197 welded or otherwise secured to the tubular shaft 198 and an additional shaft 199 is secured to the auxiliary frame by means of spaced parallel clamping plates 200 (Fig. 27). On the frame member 199 is welded or otherwise secured a bracket 201 which carries the pivot 196 for the rocker arm and a spring 202 tends to attract the lower end of the rocker arm or bias the same in a manner to keep the valve in closed position.

In order to periodically and regularly oscillate the rocker arm, a link or operating bar 203 is secured by a pivot 204 to the upper end of the rocker arm and its opposite end is slidable in the upper end of a bracket 205 fastened by means of a U-bolt 206 on the frame membe 198. In order to reciprocate the operating bar 203 it is provided with a slidably adjustable abutment 207 connected by a link 208 having its rear end engaged in an ear or lug 209 of a locking lever 210 connected by a pivot 211 with an adjustable slide 212 on the bar 203. Endwise adjustment of the abutment 207 is obtained on the member 212 by means of a screw 213 threadedly mounted in a bracket 214 attached by a swivel connection with a second bracket 215. In order to provide additional support for the tubular shaft 198, an additional support 216 may be provided having its ends secured by suitable U-clamps 217 to the frame braces 39 and to the tubular shaft 198.

In order to actuate the rocker arm a cam 218 having rollers 219 at its opposite end and supported on the shaft 220 is mounted in a pillow block 221 on a shaft forming a rigid support 222, such rigid support being connected to the tubular shafts 198 and 199. When the cam is rotated in contraclockwise direction one of the bearings 219 will engage the abutment 207 on the bar 203 and move the bearing endwise operating the rocker arm 195 to open the water valve 187. When the cam has moved free of the abutment the spring 202 will close the valve and return the abutment to its initial position (Fig. 29).

In order to rotate the shaft 220 on which the cam 218 is carried, this shaft is provided with a sprocket 223 which is driven by a chain 224 at opposite sides of the machine from the sprocket 122 on the shaft 120, the conveyor chain, when the machine is used as a harvester, having been removed from the sprocket 122. Thus when the transplanter is used it will supply water and wet the soil at spaced intervals and thus the planting can be accomplished.

If desired the machine may be adapted for use in spraying crops either with a powder or a liquid (Fig. 31). In the present instance structure is provided for spraying dust and such structure includes a hopper 225 mounted on a frame 226 attached to the frame 10. Additional braces 227 may be employed for additionally supporting the hopper. A blower 228 is mounted on a shaft 229 and is provided with a series of tangential outlets 230 to each of which is connected a flexible hose 231 and a discharge nozzle 232. A series of such discharge nozzles are located in spaced relation across the rear of the machine and are supported from a bar 233 having pivoted ends 234 for supporting the outermost nozzles, links 235 being employed for fastening the flexible hose to the bar 233 along its intermediate portion. Each end 234 is limited in its downward movement by means of a stop plate 236 and such ends 234 can be raised by means of cables 237 which extend over a portion of the frame.

In order to drive the blower a gear box 238 (Fig. 32) is provided, having gears, not shown, connected to the shaft 229 and such gears being driven by means of a shaft 240 carrying thereon a sprocket 241 driven by a chain 242 which in turn drives a sprocket 124 driven by a sprocket 243 on a shaft 244. On the shaft 244 is the idler sprocket 154 driven by a chain 245 from the rear chain driving sprocket 141, the conveyor chain of the harvester of course having been removed. Thus dusting may be accomplished.

It will be obvious to those skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof and therefore the invention is not limited by that which is illustrated in the drawings and described in the specification, but only as indicated in the accompanying claims.

What is claimed is:

1. An agricultural machine comprising a frame, ground engaging means supporting said frame for movement along the ground, a workman supporting platform carried by said frame, a conveyor mounted on said frame for conveying leaves of tobacco or the like from a lower to a higher elevation, said conveyor having at least one run extending downwardly to a position adjacent to the leaves to be conveyed to facilitate the placing of the leaves on the conveyor and having a substantially horizontal run of substantial extent above said platform to facilitate removal of leaves from said conveyor, a series of clips carried by said conveyor for receiving leaves to be conveyed, each clip being pivotally mounted so that it will be disposed in substantially the same angular position on the run which extends adjacent to the leaves where the leaves are placed in the clips and on the substantially horizontal run where they are removed therefrom, means whereby said clips are yieldably urged into leaf holding relation, and means for supporting a workman on said machine closely adjacent to the ground and said downwardly extending run whereby the workman may readily remove leaves from plants for insertion in the clips.

2. An agricultural machine comprising a frame, a traction wheel mounted at one end of said frame for pivotal movement about a substantially vertical axis, ground engaging wheels supporting said frame in spaced relation from said traction wheel, power means for driving said traction wheel, a workman supporting platform carried by said frame, a conveyor mounted on said frame for conveying leaves of tobacco or the like from a lower to a higher elevation, said conveyor having at least one run extending downwardly to a position adjacent to the leaves to be conveyed to facilitate the placing of the leaves on the conveyor and having a substantially horizontal run of substantial extent above said platform to facilitate removal of leaves from said conveyor, a series of clips carried by said conveyor for receiving leaves to be conveyed, each clip being pivotally mounted so that it will be disposed in substantially the same angular position on the run which extends adjacent to the leaves where the leaves are placed in the clips and on the substantially horizontal run where they are removed therefrom, means whereby said clips are yieldably urged into leaf holding relation, and means for supporting a workman on said machine closely adjacent to the ground and said downwardly extending run whereby the workman may readily remove leaves from plants for insertion in the clips.

3. A machine according to claim 2 in which the conveyer is driven from the power means through variable speed control mechanism.

4. A machine according to claim 1 having means for supporting a leaf receiving stick adjacent the horizontal run of the conveyor in a convenient position to receive leaves from said conveyor.

5. A machine according to claim 1 having means for supporting a leaf receiving stick adjacent the horizontal run of the conveyor in a convenient position to receive leaves from the conveyor, said means for supporting the stick including a pair of supporting members mounted in spaced relation for simultaneous rotation about a common axis, and means whereby said supporting members are maintained in a position to support a tobacco stick.

6. A machine according to claim 1 in which the mounting means for said clips is adjustable along said conveyor and including a substantially L-shaped suspending member, and spring means acting on each clip to cause said clip to grip a leaf inserted in said clip.

7. A machine according to claim 1 in which each clip includes means providing a flared mouth for receiving leaves to be conveyed.

8. A machine according to claim 1 in which each clip includes disks disposed in edge to edge relation, and

means yieldably urging said disks toward each other whereby upon the application of force to move leaves into and remove leaves from said clips the final portion of the movement will be assisted by said yieldable means.

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Long 2

Long Exh. 2

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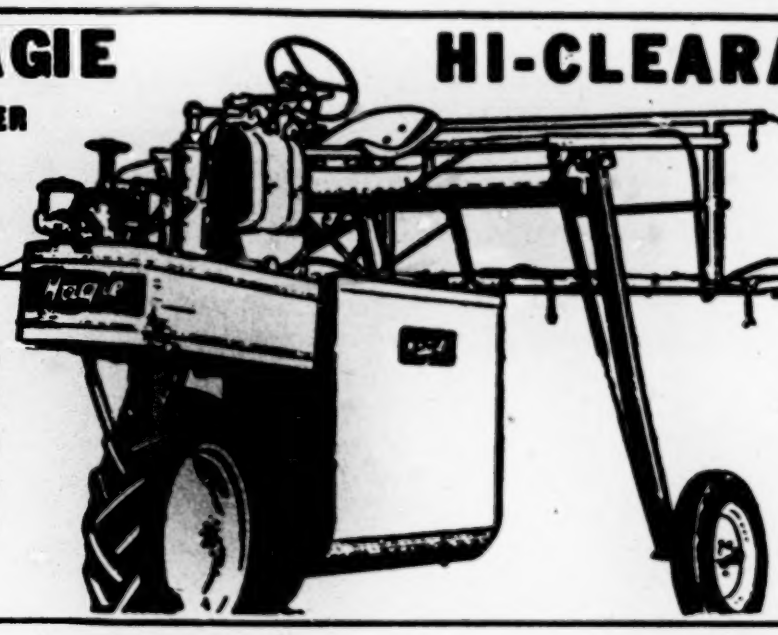

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35 The Farmwell Co., Inc., Ixonia, Wis.
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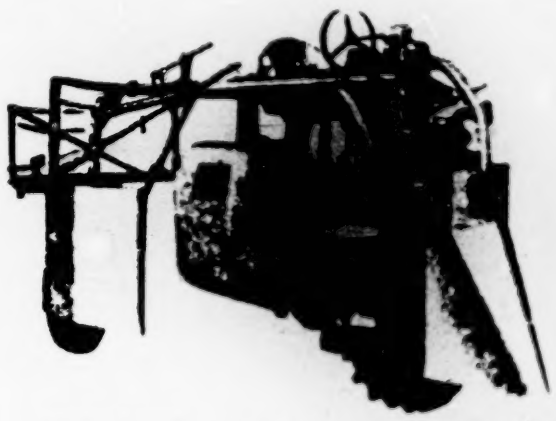
55 Hurst Industries, Inc., San Jose 6, Calif.
65 Root-Lowell Corp., 445 N. Lake Shore Drive, Chicago, Ill
80 O. W. KROMER CO., 1120 EMERSON AVE., N., MINNEAPOLIS 11, MINN.



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On and Off the Record, Cont.

my 20 bucks and, if necessary, walk . . . yes, even run . . . back into town where at least I could find someone to talk to.

Eventually I reached that little grey home in the west. I could see no one around except a mangy hound dog that wore a woeful expression; an expression somewhat akin to the one I imagined I was wearing myself. It was the first time in my life that I was not frightened by a farm dog. But I was so tired that I just walked over him, intead of circling him by about 125 yards as had been my custom in the past and has been ever since.

I crawled up to the farmhouse door and feebly knocked a salute. A fine, upstanding, sturdy and somewhat grim looking farm wife answered my summons and inquired:

"Can I help you, stranger?"

(You know that lady was 100 per cent. right. Even if I had

(Continued on Page 47)

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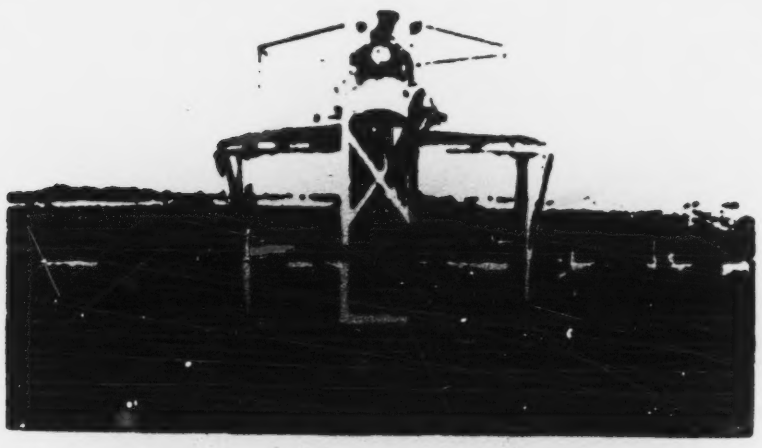
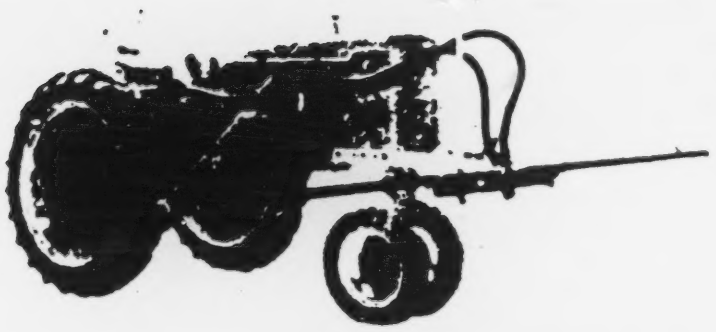
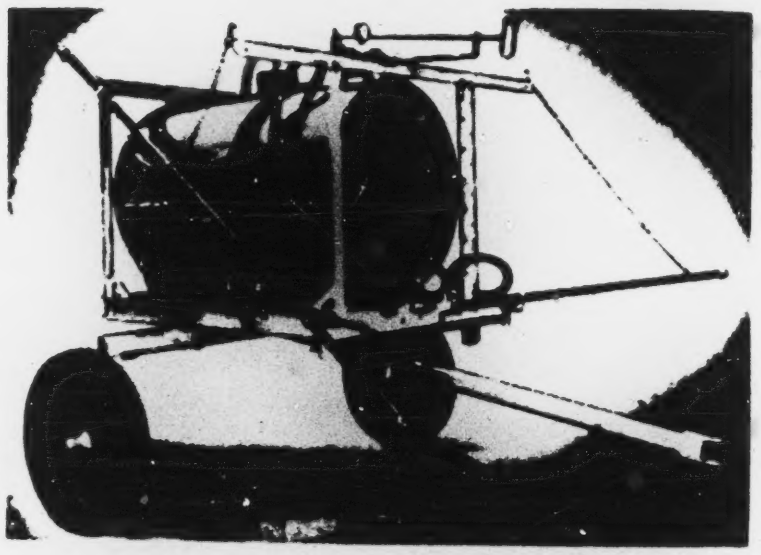


KROMER HY-ROW Self Propelled Sprayer for spraying tall row crops. KROMER Sprayers have LARGE booms, LARGE volume high pressure pumps and LARGE hose capacity for more effective corn borer and other control work.

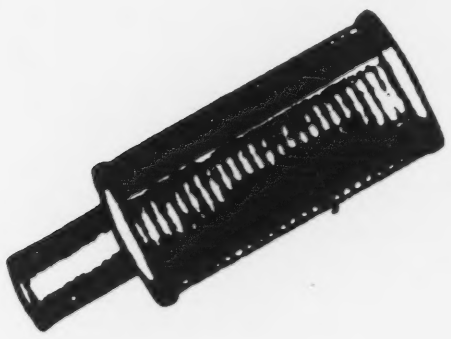


KROMER Tractor Mount Sprayers—front, rear and cultivator mounted booms. Barrel mount. Boom length 6 feet to 32 feet. Years of field service have shown that KROMER Sprayers deliver the correct volume and even distribution of chemicals.

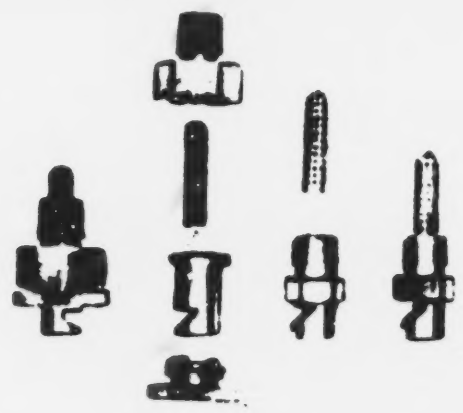


KROMER Tank Type Sprayers—trailer or skid-mounted. 125, 200, 250, 300 gallon tank sizes. Boom length 6 feet to 50 feet. Engine or P-T-O driven pump. KROMER'S pressure regulator provides accurate control for low gallonage application when necessary.

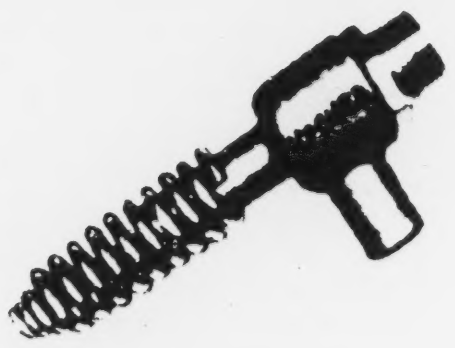
KROMER SPRAYER ACCESSORIES AND PARTS



KROMER Brass Suction Strainer with .010" slotted openings. Easily cleaned by hand. No brush needed to clean the KROMER strainer.



KROMER "NON-CLOG" NOZZLES. All brass construction with perforated screens. State Agriculture College tests prove that the larger droplets from KROMER Wide Angle Nozzles give better kill.



KROMER STEDI-FLOW PRESSURE REGULATOR holds nozzle pressure constant with changes in pump speed. KROMER Sprayers deliver the correct volume and an even distribution of chemicals.

Write for Bulletins Describing Kromer Features

O. W. KROMER CO., DEPT. 1212, MINNEAPOLIS 11, MINN.

Feb. 15, 1955 G. E. ALPHIN, JR 2,702,134

TOBACCO HARVESTER

Filed July 29, 1952 4 Sheets-Sheet 1

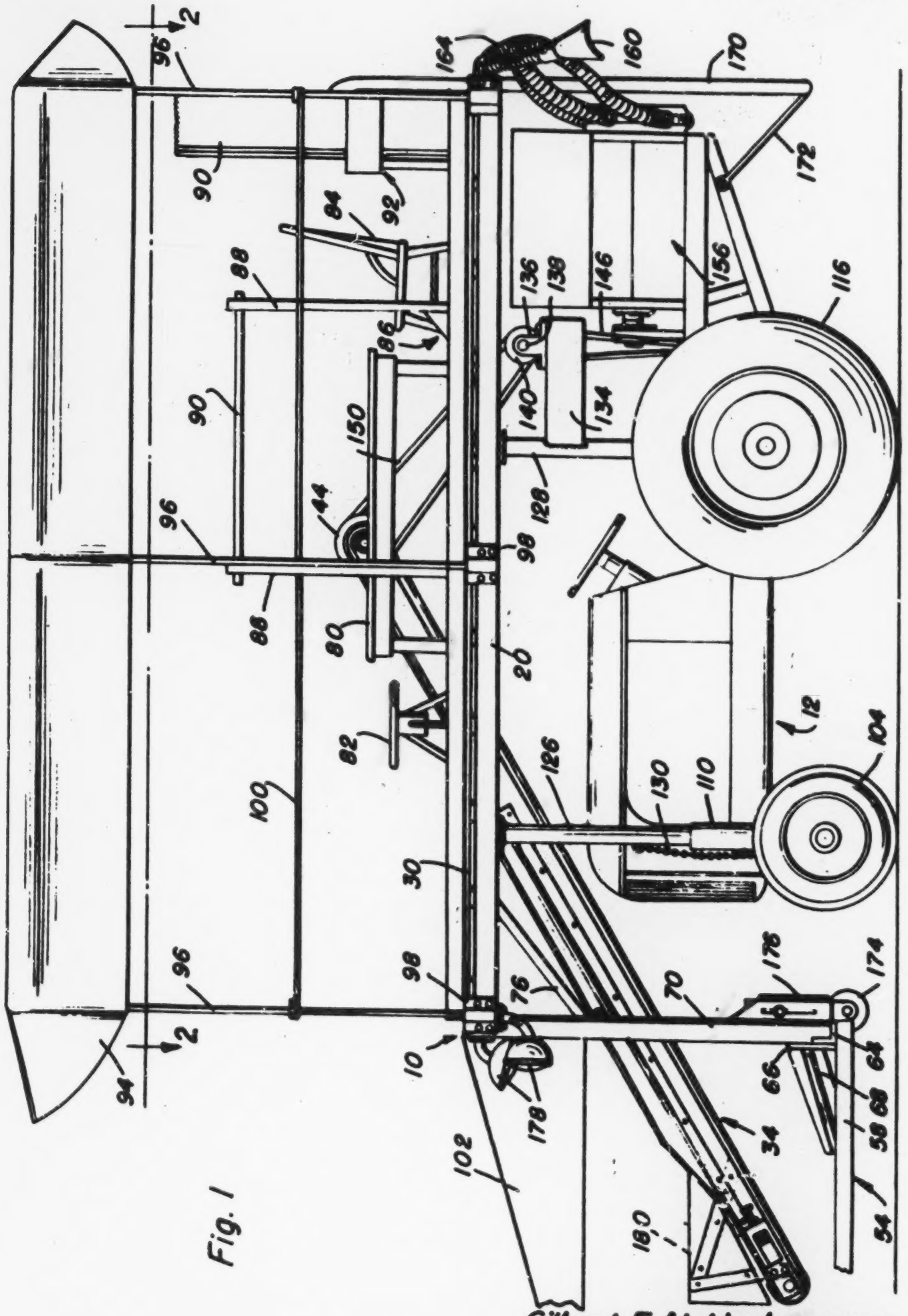


Fig. 1

Gilbert E. Alphin, Jr. INVENTOR.

BY Thomas A. O'Brien and Henry B. Jenkins Attorneys.

Feb. 15, 1955 G. E. ALPHIN, JR 2,702,134

TOBACCO HARVESTER

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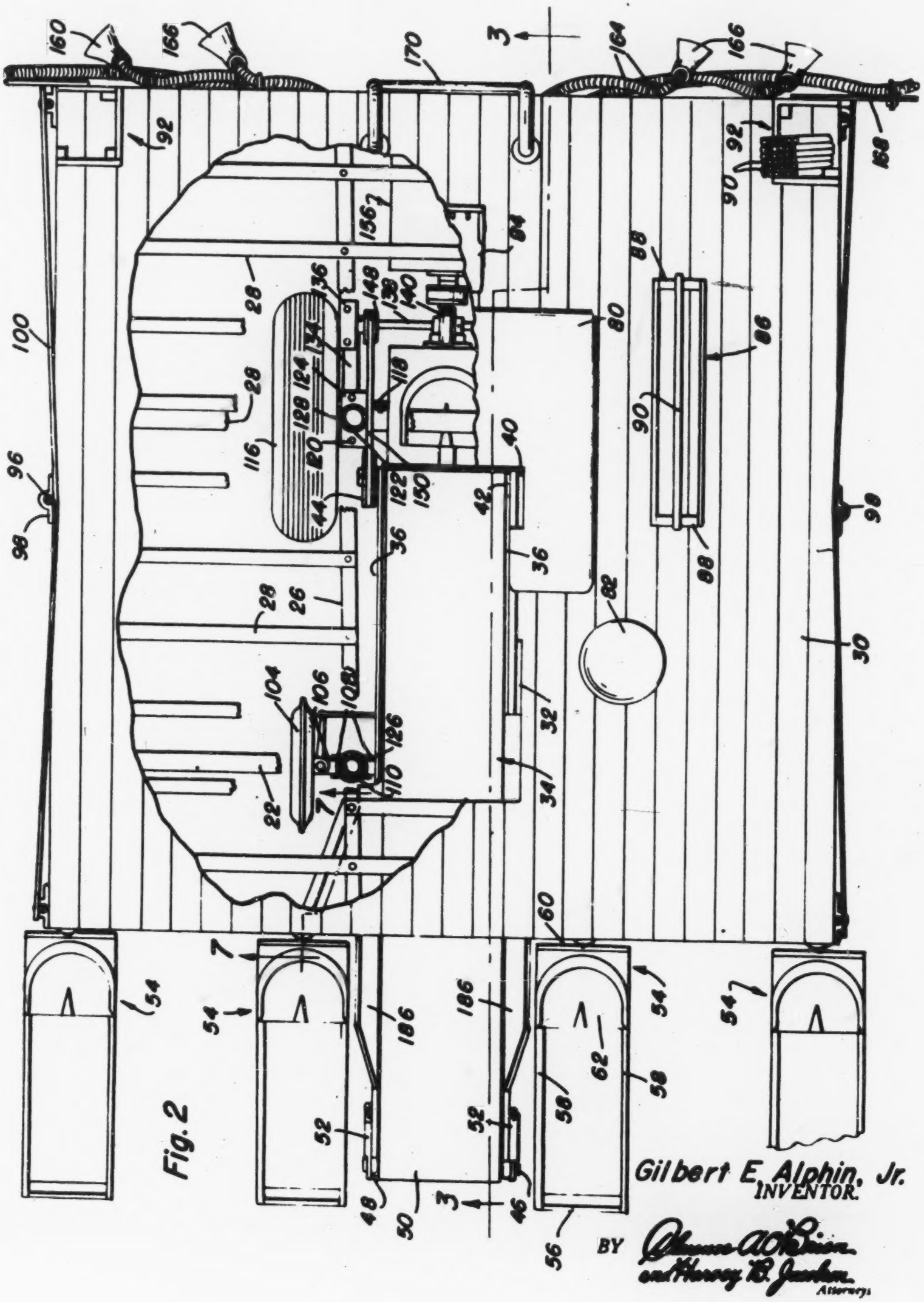

Fig. 2

Gilbert E. Alphin, Jr.
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Attorneys

Feb. 15, 1955 G. E. ALPHIN, JR 2,702,134

TOBACCO HARVESTER

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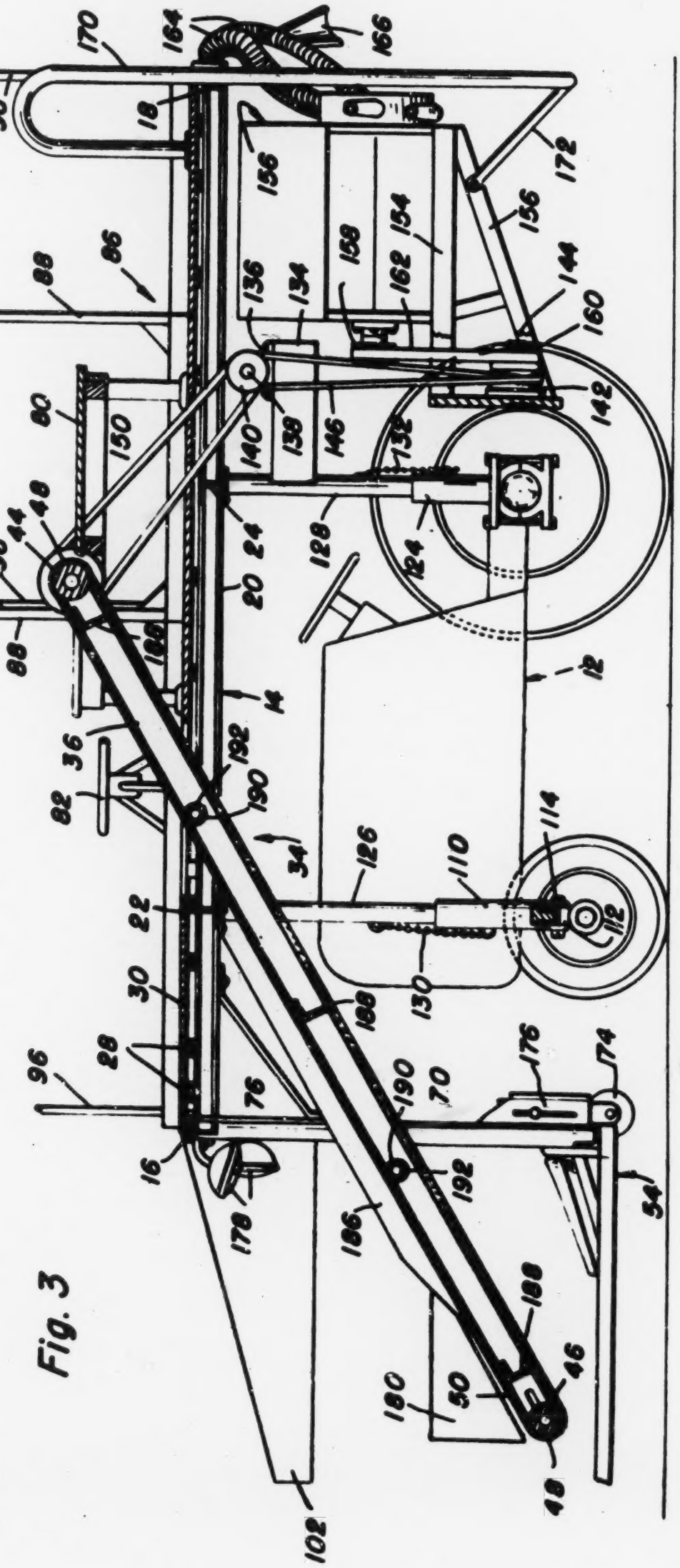

Fig. 3

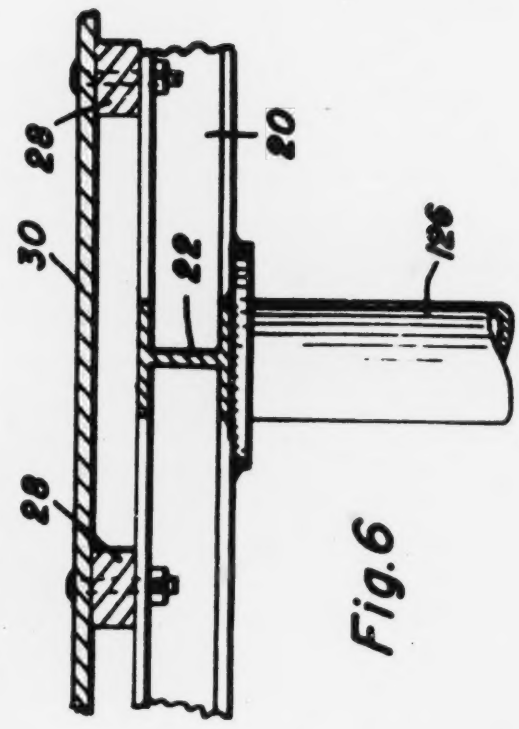

Fig. 6

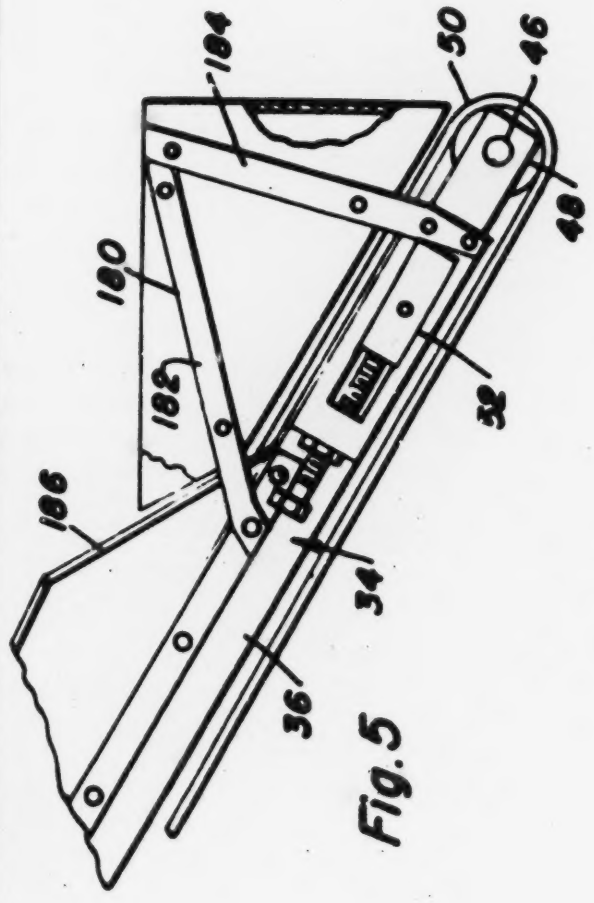

Fig. 5

Gilbert E. Alphin, Jr.

INVENTOR.

BY Thomas A. Dixon and Henry W. Jordan Attorneys.

Feb. 15, 1955 G. E. ALPHIN, JR 2,702,134

TOBACCO HARVESTER

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4 Sheets-Sheet 4

Fig. 4

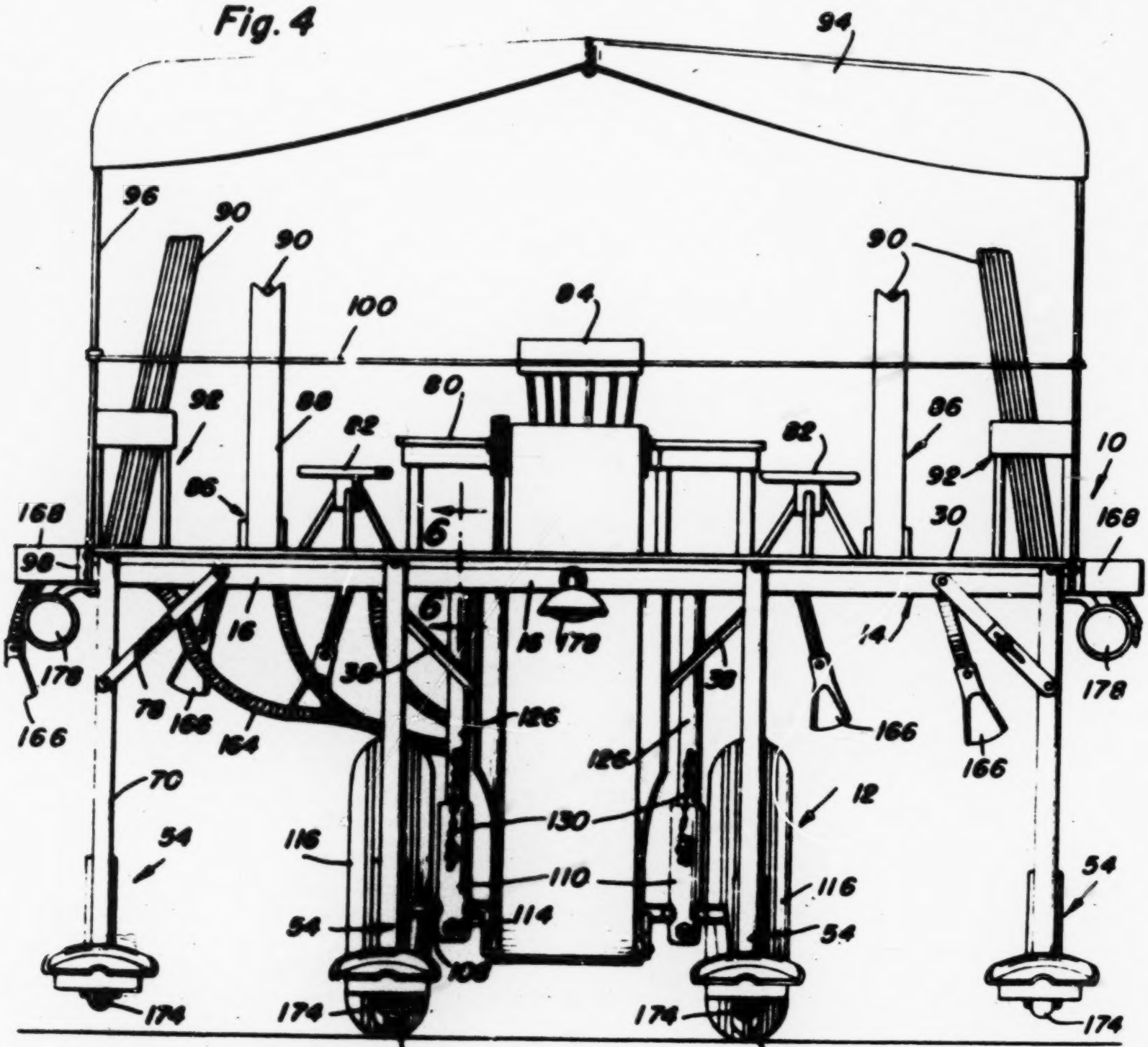
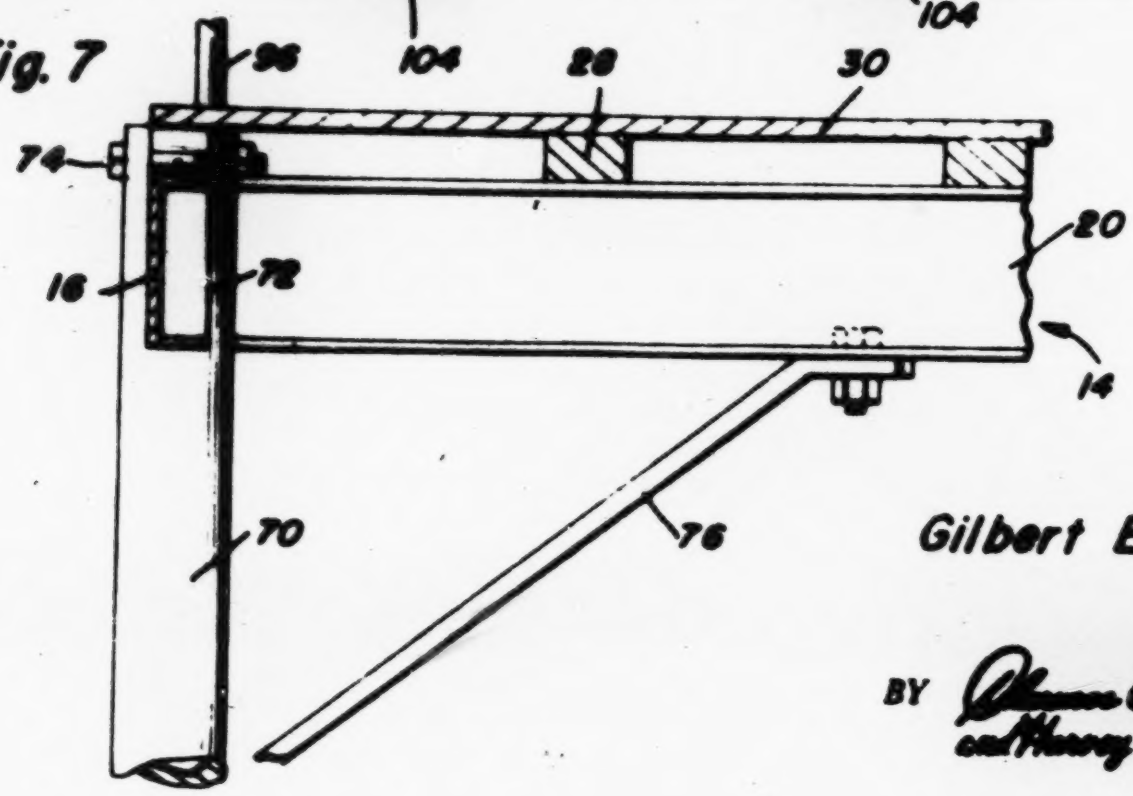


Fig. 7



Gilbert E. Alphin, Jr.
INVENTOR.

BY Thomas A. O'Brien and Henry W. Jamison
Attorneys

United States Patent Office

2,702,134

Patented Feb. 15, 1955

2,702,134

TOBACCO HARVESTER

Gilbert E. Alphin, Jr., Kennesville, N. C.

Application July 29, 1952, Serial No. 301,561

6 Claims. (Cl. 214—83.1)

This invention relates in general to harvesting machinery, and more specifically to a mobile tobacco havvester.

At the present time in the southern tobacco growing States a single field of tobacco is harvested on the average of six times with the individual leaves of the tobacco plants being picked as they ripen. Inasmuch as the tobacco plants are grown out in the open and the leaves are disposed at a relatively low level the picking of the ripe tobacco leaves from tobacco plants becomes a back breaking job which must be done out under the broiling sun. Due to this fact, the southern tobacco growers are now finding it difficult to hire local help for this harvesting operation. It is, therefore, desirable to provide a suitable tobacco harvester which will eliminate the back bending and place the pickers out of the sun.

The manufacturers of farm equipment are now producing practically every type of implement which may increase the production of a farmer and at the same time lessen the work load on him. However, in spite of the advances made in the recent years in farming equipment there is still lacking a suitable device for harvesting tobacco with the result that the tobacco is still being picked by hand and the only machinery being utilized is a tractor for drawing tobacco wagons from the field to the barns where the tobacco is cured.

The primary object of this invention is to provide an improved tobacco harvester which may be driven through a field of tobacco carrying workmen in a relatively relaxed position whereby they may pick the ripe leaves from tobacco plants while in a relatively comfortable position.

Another object of this invention is to provide an improved tobacco harvester which is mobile and which may be driven through a tobacco field with certain workmen positioned thereon picking tobacco while other workmen are wrapping the tobacco into hands and mounting the same on sticks for curing.

Another object of this invention is to provide an improved tobacco harvester which may be utilized in the picking of the ripe leaves from tobacco plants and which is provided with a conveyor for conveying bunches of picked leaves to a hand forming station whereby the bunches of leaves are wrapped into hands, said leaves being free from crushing and the direct heat of the sun.

Another object of this invention is to provide an improved tobacco harvester which includes an elevated platform having depending therefrom a plurality of workmen's supports, said workmen's supports being so secured to the platform whereby they may be spaced as desired to accommodate various widths of tobacco rows.

Another object of this invention is to provide an improved tobacco harvester which may be simultaneously utilized for the picking of leaves from tobacco plants and the dusting of the plants after the ripe leaves have been gathered therefrom.

Another object of this invention is to provide an improved tobacco harvester which may be conveniently mounted on a wheeled vehicle, such as a tractor, for movement thereby to a tobacco field, said tobacco harvester being easily and quickly removed from a tractor with which it is associated.

A further object of this invention is to provide an improved tobacco harvester which may be easily and

quickly converted into a harvester for corn or similar farm products in addition to be convertible into a tobacco planter and the like.

With these objects definitely in view, this invention resides in certain novel features of construction, combination and arrangement of elements and portions as will be hereinafter described in detail in the specification, particularly pointed out in the appended claims, and illustrated in the accompanying drawings which form a material part of this application and in which:

Figure 1 is a side elevational view of the tobacco harvester which is the subject of this invention and shows the same mounted on a tractor for movement thereby, a foldable awning being mounted at the forward end of the tobacco harvester and being shown in dotted lines, and a corn receiving hopper being mounted at the forward end of a conveyor of the harvester for use when the harvester is being utilized for gathering corn;

Figure 2 is a transverse horizontal sectional view taken through the top awning portion of the tobacco harvester of Figure 1 along section line 2—2 and shows the general arrangement of the workmen's supports and the work stations mounted on the platform thereof, a portion of the platform being broken away in order to clearly illustrate the manner in which a conveyor is driven by the tractor and the platform is supported from the tractor;

Figure 3 is a fragmentary longitudinal vertical sectional view taken substantially upon the plane indicated by the section line 3—3 of Figure 2 and shows the general construction of the tobacco harvester and the tractor on which it is mounted, the tractor being shown by broken lines;

Figure 4 is a front elevational view of the tobacco harvester of Figure 1 and shows the general relationship of the various portions thereof with respect to each other and the tractor on which the tobacco harvester is mounted;

Figure 5 is an enlarged fragmentary side elevational view of a forward end of the conveyor of the tobacco harvester and shows the same mounted with the hopper receiving ears of corn when the harvester is utilized for picking corn, portions of the hopper being broken away and shown in section in order to clearly illustrate the construction thereof;

Figure 6 is an enlarged fragmentary transverse vertical sectional view taken substantially upon the plane indicated by the section line 6—6 of Figure 4 and shows the general construction of the frame of the tobacco harvester and relationship of the platform supported thereby;

Figure 7 is an enlarged fragmentary longitudinal vertical sectional view taken substantially upon the plane indicated by the section line 7—7 of Figure 2 and shows the manner in which standards of the workmen's supports are adjustably connected to the frame of the tobacco harvester.

Similar characters of reference designate similar or identical elements and portions throughout the specification and throughout the different views of the drawings.

Referring now to the drawings in detail, it will be seen that the tobacco harvester, which is the subject of this invention, is referred to in general by the reference numeral 10 and is mounted for movement on a suitable farm tractor which is referred to in general by the reference numeral 12. It will be understood that the assembly is completely mobile and that the tractor, when provided with the tobacco harvester 10, is adapted to run down a path in a tobacco field between rows of tobacco, said path being formed by omitting each fifth row of tobacco so as to facilitate the removal of the tobacco from the field.

The tobacco harvester has a main support in the form of an elevated generally rectangular frame which is referred to in general by the reference numeral 14. The frame 14 includes a generally rectangular border formed by a front frame member 16, a rear frame member 18 and a pair of spaced parallel side frame members 20. The frame 14 also includes a front inter-

mediate frame member 22 which extends transversely between the side frame members 20 and is rigidly secured to the same at points rearwardly of their connection to the front frame member 16. A similar rear intermediate frame member 24 is provided, the intermediate rear frame member 24 being in spaced parallel relation to the rear frame member 18. The frame members are preferably formed of channel members although other structural shapes may be utilized as desired.

Referring now to Figure 2 in particular, it will be seen that the frame 14 also includes a pair of longitudinally extending frame members which are referred to by the reference numeral 26. The longitudinal frame members 26 are preferably formed of pipes which pass through and are secured to the webs of the intermediate frame members 22 and 24. The longitudinal frame members 26 terminate at their intersections with the front and rear frame members of the frame 14.

Overlying the frame 14 and secured to the frame elements thereof by suitable fasteners are a plurality of transversely extending floor joists 28 which may be formed of conventional wood framing. The joists 28 have overlying the same floor boards which form a flooring of a platform 30.

The platform 30 is provided with a centrally located opening 32 therethrough through which projects an upper end of a conveyor which is referred to in general by the reference numeral 34. The conveyor 34 includes a pair of longitudinally extending side frame members 36 which pass through the two longitudinal frame members 26 and beneath the front intermediate frame member 22. The side frame members 36 of the conveyor 34 are connected to the front intermediate frame member 22 by suitable fastening means. The fastening means is preferably in the form of a pair of diagonal braces 38 although other suitable means may suffice.

The conveyor 34 also includes a drive shaft 40 disposed at the rear end thereof and extending between the side frame members 36 in which the same is journaled. The shaft 40 has mounted thereon a drive roller 42 which is positioned between the side frame members 36. One end of the drive shaft 40 extends outwardly beyond one of the side frame members 36 and has mounted thereon a drive pulley 44. The front end of the conveyor 34 includes an idler shaft 46 which extends between and is journaled in the front ends of the side frame members 36. The idler shaft 46 has mounted thereon an idler drum 48. Entrained over the drums 42 and 48 is an endless conveyor belt 50 adapted to transport tobacco from a point adjacent the ground at the front of the tobacco harvester 10 to a point on the platform 30. In order that the conveyor belt 50 may be tensioned, the idler shaft 46 is adjustably mounted in a pair of adjustable mounting brackets 52 carried by the front ends of the side frame members 36.

Carried at the front of the frame 14 and suspended from the front frame member 16 in spaced parallel relation is a plurality of workmen's supports which are referred to in general by the reference numeral 54. Inasmuch as the workmen's supports are identical, only one of the same will be described in detail.

Each workman's support 54 includes a generally rectangular frame formed of a front frame member 56, side frame members 58, and a rear frame member 60. Mounted on the side frame members 58 adjacent the rear frame member 60 is a suitable seat 62 in which may be seated a workman. The front frame member 56 forms a foot rest for the workman seated in the seat 62 so as to provide a proper support for his feet.

Referring now to Figure 1 in particular, it will be seen that overlying the rear frame member of the frame of the workman's support 54 is a rearwardly facing angle member 64. Also extending transversely of the frame and secured to the side frame members 58 thereof is a vertical plate 66, the vertical plate being secured in face to face relation with the vertical flange of the angle member 64. Extending forward and downwardly from the ends of the plate 66 are diagonal braces 68 for rigidly supporting the frame.

Secured to the angle member 64 and the plate 66 centrally thereof is a vertically extending tubular standard 70. As is best illustrated in Figure 7, the upper end of the tubular standard is provided with an elongated slot 72 in which may be received the front frame member 16. The slot 72 is of a greater depth than the height of the front

frame member 16 and the ends of the standard 70 formed by the same extend upwardly beyond the top of the frame member. These ends are connected by a transversely extending fastener 74 which prevents the removal of the standard 70 but does not limit the sliding movement of the same with respect to the frame member.

Should it be found necessary to brace the standards 70 against swinging in longitudinal planes, the frame members of the frame 14 may have secured thereto one end of a suitable angle brace 76 whose other end is secured to an associated standard 70 adjacent the upper end thereof.

Referring now to Figure 4 in particular, it will be seen that the outermost standards are disposed at slight angles to the vertical so that the spacing of the lower portion of the workmen support with respect to its adjacent workmen support is increased. The standards 72 are held in these positions by adjustable diagonal braces 78 which are secured at their ends to the front frame member 16 and the standard 70 by suitable fasteners.

While the workmen's supports 54 have been illustrated and described as being secured to the front frame member 16 of the frame 14, it will be understood that the same may be also secured to the side frame members 20 if it is found to be so desired.

It will be noted that the front end of the conveyor 34 is disposed between the two central workmen's supports 54 in a position whereby a workman seated thereon may conveniently lay tobacco leaves on the conveyor belt 50 for movement to a work station on the platform 30. The work station 30 includes a generally U-shaped table 80 which partially surrounds the upper end of the conveyor 34. Mounted on the platform 30 adjacent the forward ends of the table 80 is a pair of suitable seats 82 on which may be seated workmen who remove the tobacco leaves from the conveyor belt 50 and tie the same into hands. Should the workmen seated on the seats 82 be unable to keep up with the workmen carried by the workmen's supports 54, another workman seated on a suitable seat 84 at the rear of the table 80 will position the excess tobacco leaves on the top of the same and move them towards the workmen on the seats 82 in order that they may tie the same during a slack period. It is also understood that the workman seated on the seat 84 may be engaged in a hand forming operation should it be necessary.

Positioned adjacent the opposite sides of the table 80 are suitable tobacco stick supports 86. Each tobacco stick support 86 includes a pair of longitudinally spaced aligned vertical support members 88 which are provided with generally V-shaped notches in their upper ends. Tobacco sticks 90 are adapted to be carried by the support members 88 and have received thereon hands tied by the workmen seated on the seats 82. It will be understood that the hands of tobacco leaves are placed on the tobacco sticks by other workmen who receive the same from the workmen seated on the seats 82. After a tobacco stick 90 has been filled with hands of tobacco, the same may be either laid on the forward portions of the platform 30 or mounted in suitable racks (not shown).

Formed at the rear corners of the platform 30 are suitable racks 92 which extend vertically upwardly therefrom. The racks 92 are of such a size and shape so as to conveniently hold extra tobacco sticks prior to their mounting in the support 86.

It will be noted that the platform 30 is covered by a suitable awning 94 which is supported by a plurality of inverted U-shaped supports 96. The supports 96 have their lower ends seated in suitable sockets 98 secured to the other sides of the side frame members 20 of the frame 14. The supports 96 are also laced together intermediate their ends by a suitable lacing 100.

Referring to Figure 1 in particular, it will be seen that there is illustrated by broken lines a second awning 102. The awning 102 may be of any suitable design but is preferably foldable whereby the same may be raised out of overlying relation with the workmen's supports 54. The awning 102 is primarily intended to protect the workmen seated on the workmen's supports 54 from the direct rays of sun although it is helpful in protecting the tobacco disposed upon the conveyor 34 from the direct rays of the sun.

It will be understood, that although the tobacco harvester 10 has been illustrated as being mounted on the tractor 12, that the same may be mounted on any suitable wheeled frame.

The tractor 12, which is a conventional tractor, includes front wheels 104 supported by an outwardly extending front axle 106. The front axle 106 may be of the type wherein implements are connected thereto by a plurality of bolts 108. Mounted on the axle 106 adjacent each end thereof is a tubular mounting bracket 110 whose purpose will be explained in more detail hereinafter. As is best illustrated in Figure 3 and 4, the tubular mounting bracket 110 is provided with an elongated downwardly opened slot 112 at its lower end for receiving the axle 106. Also, the sides of the mounting bracket 110 are recessed in order to provide clearance for the bolts 108.

When it is desired to install one of the front mounting brackets 110, the same is disposed at a slight angle to the vertical paths between adjacent bolts 108. The individual mounting brackets 110 are then moved to the vertical position illustrated and if desired, may be provided with a suitable fastener 114 disposed below the axle 106 to prevent removal of the mounting bracket. The tractor 12 also includes a pair of rear wheels 116 which are mounted on the ends of the rear axles, the rear axles being supported by rear axle housings 118 which extend outwardly from opposite sides of the tractor frame. The tractor 12 is normally equipped with fenders for protecting the operator of the same from mud and other foreign matter being thrown by the rear wheels 116. These fenders have been removed from the tractor 12 and secured to the rear axle housings 118 by suitable fasteners 120 of the type normally utilized for attaching the fenders is a mounting plate 122. The mounting plate 122 has secured to the upper surface thereof an upwardly directed tubular rear mounting bracket 124. It will be understood that there is one such tubular mounting bracket 124 on each side of the tractor. While one specific means by which the tubular mounting brackets 110 and 124 are secured to the tractor 12 has been illustrated and described, it will be understood that the securing method will vary for different types of tractors.

Telescoped within the front mounting brackets 110 are front tubular standards or supports 126. The frame 14 is so designed that the upper ends of the front tubular standards 126 engage the front intermediate frame member 22 at its intersection with the longitudinal frame members 26. In this manner the joint between the front standards 126 and the front intermediate frame member 22 is greatly reinforced.

The rear mounting brackets 124 also have telescoped therein rear standards or supports 128. The rear standards extend upwardly from the rear mounting brackets 124 and have their upper ends secured to the lower flange of the rear intermediate transverse frame member 28 at its intersections with the longitudinal frame members 26.

It will be understood that the front standards 126 normally have their lower ends supported directly by the front axle 106 and that their lower end portions are merely guided by the front mounting bracket 110. Should one of the front wheels of the tractor 12 drop into a sink hole or the like, the frame 14 will have a tendency to remain level and the mounting bracket 110 associated with the particular front wheel will move downwardly with respect to the associated front standard 126. In order that the standards 126 may not accidentally move all the way out of their respective mounting brackets 110, they are connected to the same by links of flexible connecting material 130 which may be in the form of chains.

The rear standards 128 are supported with the rear mounting brackets 124 in a similar manner, but engage the plates 122 at their lower ends. The rear standards 128 are also connected to their mounting brackets 124 by flexible connecting members 132 to prevent accidental separation of the same.

Referring now to Figure 3 in particular, it will be seen that carried by the rear standards 128 and extending rearwardly therefrom are horizontal support arms 134. The horizontal support arms 134 have mounted on the upper flanges thereof suitable pillow blocks 136. The pillow blocks 136 are transversely aligned and have rotatably mounted therein a transversely extending shaft 138.

The shaft 138 has mounted thereon a pulley 140 which is substantially in alignment with a first pulley 142 carried by a power take-off shaft 144 of the tractor 12. Extending between and entrained over the pulleys 140 and 142 is a first drive belt 146.

Also carried by the shaft 138 in longitudinal alignment with the drive pulley 44 of the conveyor 34 is a pulley 148. Entrained over and extending between the pulleys 44 and 148 is a drive belt 150 which rotates the drive shaft 40 to cause movement of the conveyor belt 50 upon rotation of the power take-off shaft 144.

Referring now to Figure 3 in particular, it will be seen that carried by the rear of the tractor 12 is a transversely extending vertical mounting plate 152. Extending rearwardly therefrom is a platform 154 which is braced from the mounting plate 152 by a plurality of diagonal braces 156. Carried by the platform 154 is a suitable dusting machine 157. The dusting machine 157 includes a drive shaft on which is mounted a drive pulley 158. The drive pulley 158 is in vertical alignment with a second pulley 160 mounted on the power take-off shaft 144. Extending between and entrained over the pulleys 158 and 160 is a drive belt 162 for driving the duster 157.

Extending from the other side of the duster 157 is a plurality of flexible dust lines 164 which terminate in dusting heads 166. The dusting heads 166 are supported by either the rear frame member 18 of the frame 14 or by extensions 168 secured thereto and extending outwardly from the rear of the tobacco harvester 10. It will be understood that the dusting mechanism may be utilized while a tobacco harvesting operation is in process so as to combine two operations in one.

Disposed at the rear of the platform 30 and secured thereto is an inverted J-shaped ladder 170. The ladder 170 is of a conventional construction and is utilized for gaining access from the ground to the platform 30. The lower end of the ladder 170 is braced by a diagonal brace 172 whose forward end is connected to one of the diagonal braces 156.

In order to facilitate the removal of the tobacco harvester 10 from the tractor and also to engage the ground in the event that any of the wheels drop into sink holes or the like, the standards 70 of the workmen's supports 54 have mounted thereon ground engageable wheels 174. The wheels 174 are connected to their respective standards by suitable mounting brackets 176.

When it is desired to remove the tobacco harvester 10 from the tractor 12, the two central workmen's supports 54 are moved out of alignment with the wheels of the tractor and the two outer workmen's supports are detached from the front frame member 16 and secured to the rear frame member 18. The tractor 12 is then driven between a pair of sloping runways which engage the wheels 174. The action of the sloping runways is to raise the front and rear standards 126 and 128 out of their respective mounting brackets and permit the tractor 12 to drive on without the tobacco harvester 10. It will be understood that certain of the connections between the tobacco harvester and the tractor 12 must be disconnected prior to this operation. It will also be understood that the tractor harvester may be mounted back on the tractor 12 by a reversal of the above outlined operation. During a tobacco harvesting operation, the tractor 12 with the tobacco harvester 10 mounted thereon is driven down the path between adjacent rows of tobacco plants. Seated on each of the workmen's supports 54 is a workman whose job is to remove the ripe leaves from the tobacco plants. Each workman accumulates a handful of leaves which is sufficient to form a hand of tobacco, as outlined above, the grouped or bunch of leaves is then placed on the conveyor belt 50 and moved upwardly where they are formed into hands. It will be understood that inasmuch as the conveyor belt is continuously moving that no bunch of tobacco leaves will be disposed on other tobacco leaves and, therefore, bruising of the same is prevented. Furthermore, inasmuch as the picked tobacco leaves remain under cover there is no sudden drying of the same prior to their hanging in a suitable storage shed.

Inasmuch as the workmen picking the tobacco leaves from the tobacco plants are seated in a comfortable position and protected from the direct rays of the sun the tobacco picking operator becomes more efficient. Furthermore, inasmuch as the bunches of tobacco leaves are moved directly to the hand formers without engagement with other tobacco leaves no entanglement of the leaves result and the hands may be quickly formed. A

further advantage of the present tobacco harvester is in that the platform 30 is elevated and the tobacco stick loaded with hands of tobacco may be passed into a suitable storage shed or barn at a raised level whereby the raising of the tobacco up into the top of the barn is greatly facilitated.

Inasmuch as it is necessary that the tobacco leaves be picked as soon as they ripen, it is desirable that the tobacco picking operation proceed on schedule. Should it be necessary, the tobacco harvester may be provided with suitable lights, such as the lights 178, for night work. The lights 178 would be powered from the electrical system of the tractor 12.

The tobacco harvester 10 also has a further advantage inasmuch as it may be utilized for harvesting corn crops. When the tobacco harvester 10 is utilized for harvesting corn crops there is mounted on the forward end of the conveyor 34 a suitable hopper 180. The hopper 180 is maintained in position by braces 182 and 184 which are secured to the side frame members 36 thereof. The hopper is necessary inasmuch as the ears of corn would have a tendency to roll off the lower end of the conveyor belt 50 or outer sides thereof inasmuch as side shields 186 of the conveyor 34 terminate short of the lower end thereof.

Referring now to Figure 3 in particular, it will be seen that the conveyor 34 may also include intermediate transverse frame members 188 which connect together the side frame members 36. Also, the conveyor belt 50 may be supported intermediate the rollers 42 and 48 by intermediate rollers 190 mounted on idler shafts 192.

The above mentioned attachments are merely a few of the attachments which may be conveniently connected to the tobacco harvester 10 for either planting, working or harvesting other crops.

Also, I would like to mention the fact that during tobacco harvesting time it is necessary to top and sucker tobacco near the same number of times that the leaves are harvested. This machine is so arranged as to carry two or more workmen for that purpose, suspended on each side in the same manner and on the same type of supports as the ones used in front for tobacco pickers. This enables the farmer or supervisor driving the vehicle to supervise the picking of ripe leaves of tobacco, suckering and topping, handing and tying, and dusting the tobacco all in one operation, with all of his help gathered on one vehicle in relatively comfortable positions out of the sun.

The statistics show that a great majority of all tobacco farmers, as well as other farmers, have tractors. During tobacco harvesting season there is very little help that the tractor has been to the tobacco farmer, since there was no equipment made to attach to the tractor for harvesting tobacco. By the use of this machine the tobacco farmer is enabled to use his tractor to a greater advantage and without any additional cost for powering the harvester.

The operation of this device will be understood from the foregoing description of the details thereof, taken in connection with the above recited objects and drawings. Further description would appear to be unnecessary.

Minor modifications of the device, varying in minor details from the embodiment of the device illustrated and described here, may be resorted to without departure from the spirit and scope of this invention, as defined in the appended claims.

Having described the invention, what is claimed as new is:

1. A mobile tobacco harvester comprising a generally rectangular workman supporting platform, said platform having a plurality of spaced supports depending therefrom, said supports having on their lower ends means for attachment to tractor axles, said platform having a forward end portion, said forward end portion having a plurality of transversely aligned depending standards, each having on its lower portion a workman's station, said platform having an opening therethrough, an elevating conveyor extending through said opening and extending from adjacent said workman's stations to a point above said platform, whereby workmen on said stations may pick tobacco leaves and place the same on said conveyor for movement above said platform where they are received by other workmen.

2. A mobile tobacco harvester comprising a generally rectangular workman supporting platform, said platform having a plurality of spaced supports depending therefrom, said supports having on their lower ends means for attachment to tractor axles, said platform having a forward end portion, said forward end portion having a plurality of transversely aligned depending standards, each having on its lower portion a workman's station, said platform having an opening therethrough, an elevating conveyor extending through said opening and extending from adjacent said workman's stations to a point above said platform, whereby workmen on said stations may pick tobacco leaves and place the same on said conveyor for movement above said platform where they are received by other workmen, said forward end portion including a forward transverse frame member, said standards being adjustably positioned on said frame member to accommodate various row spacings.

3. A mobile tobacco harvester comprising a generally rectangular workman supporting platform, said platform having a plurality of spaced supports depending therefrom, said supports having on their lower ends means for attachment to tractor axles, said platform having a forward end portion, said forward end portion having a plurality of transversely aligned depending standards, each having on its lower portion a workman's station, said platform having an opening therethrough, an elevating conveyor extending through said opening and extending from adjacent said workman's stations to a point above said platform, whereby workmen on said stations may pick tobacco leaves and place the same on said conveyor for movement above said platform where they are received by other workmen, said platform including a border framing extending about the general periphery thereof, said standards being adjustably carried by said border framing for selective positioning thereabout.

4. A mobile tobacco harvester comprising a generally rectangular workman supporting platform, said platform having a plurality of spaced supports depending therefrom, said supports having on their lower ends means for attachment to tractor axles, said platform having a forward end portion, said forward end portion having a plurality of transversely aligned depending standards, each having on its lower portion a workman's station, said platform having on opening therethrough, an elevating conveyor extending through said opening and extending from adjacent said workman's stations to a point above said platform, whereby workmen on said stations may pick tobacco leaves and place the same on said conveyor for movement above said platform where they are received by other workmen, said platform including a border framing extending about the general periphery thereof, said standards being adjustably carried by said border framing for selective positioning thereabout, certain of said standards being movable to a rear portion of said border framing to support the rear of said platforms when removed from a tractor.

5. A mobile tobacco harvester comprising a generally rectangular workman supporting platform, said platform having a plurality of spaced supports depending therefrom, said supports having on their lower ends means for attachment to tractor axles, said platform having a forward end portion, said forward end portion having a plurality of transversely aligned depending standards, each having on its lower portion a workman's station, said platform having an opening therethrough, an elevating conveyor extending through said opening and extending from adjacent said workman's stations to a point above said platform, whereby workmen on said stations may pick tobacco leaves and place the same on said conveyor for movement above said platform where they are received by other workmen, said workman's supports being provided with ground engageable wheels for facilitating removal of said platform from a tractor.

6. A mobile tobacco harvester comprising a generally rectangular workman supporting platform, said platform having a plurality of spaced supports depending therefrom, said supports having on their lower ends means for attachment to tractor axles, said platform having a forward end portion, said forward end portion having a plurality of transversely aligned depending standards, each having on its lower portion a workman's station, said platform having an opening therethrough, an elevating conveyor extending through said opening and extending from adjacent said workman's stations to a point

above said platform, whereby workmen on said stations may pick tobacco leaves and place the same on said conveyor for movement above said platform where they are received by other workmen, said means including tubular mounting brackets detachably receiving said lower ends of said standards, mounting means on said mounting brackets for attachment to a tractor.

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No. 699,408.

Patented May 6, 1902.

G. A. OWEN.

MAIL SERVICE APPARATUS.

(Application filed Mar. 18, 1899.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1.

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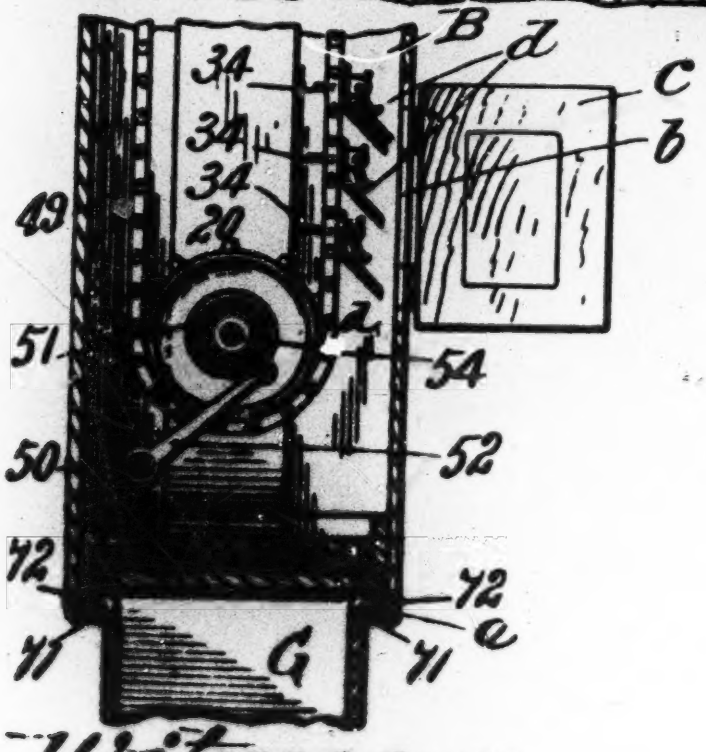
MAIL SERVICE APPARATUS.

(Application filed Mar. 18, 1899.)

(No Model.) 3 Sheets—Sheet 2.

Fig. 2.



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(Application filed Mar. 13, 1899.

(No Model.) 3 Sheets—Sheet 3.

Fig. 4.

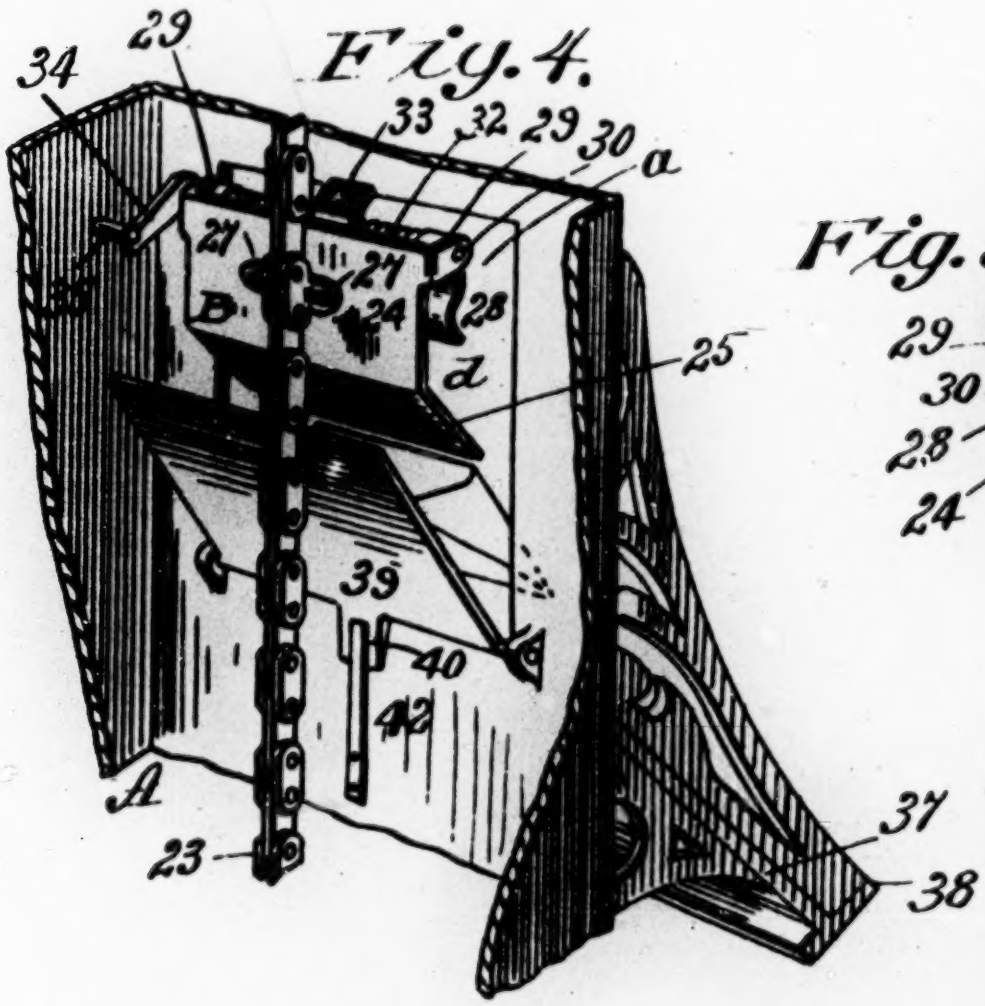


Fig. 5.

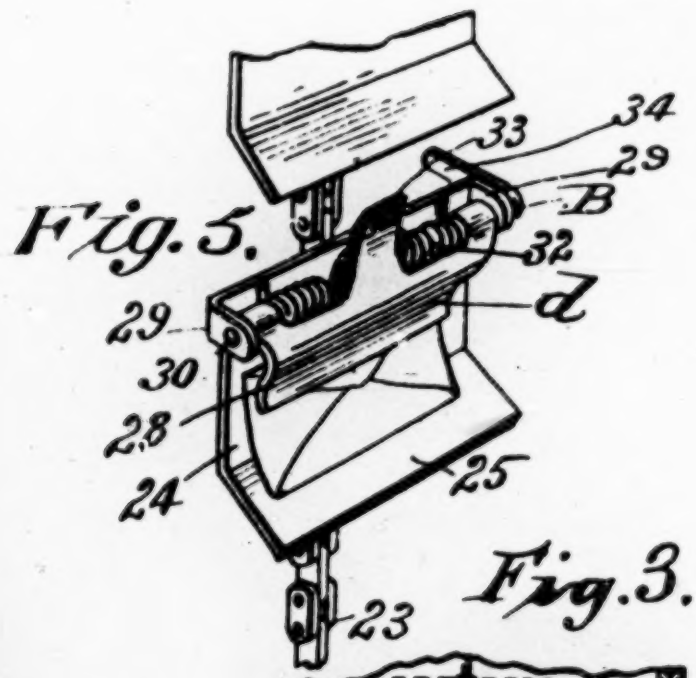


Fig. 3.

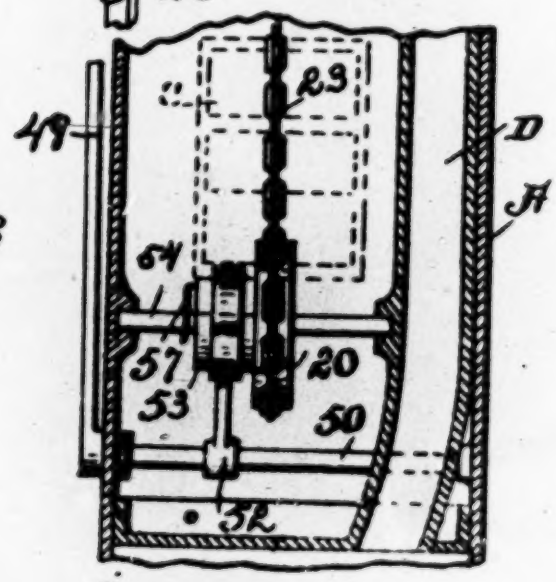


Fig. 6.

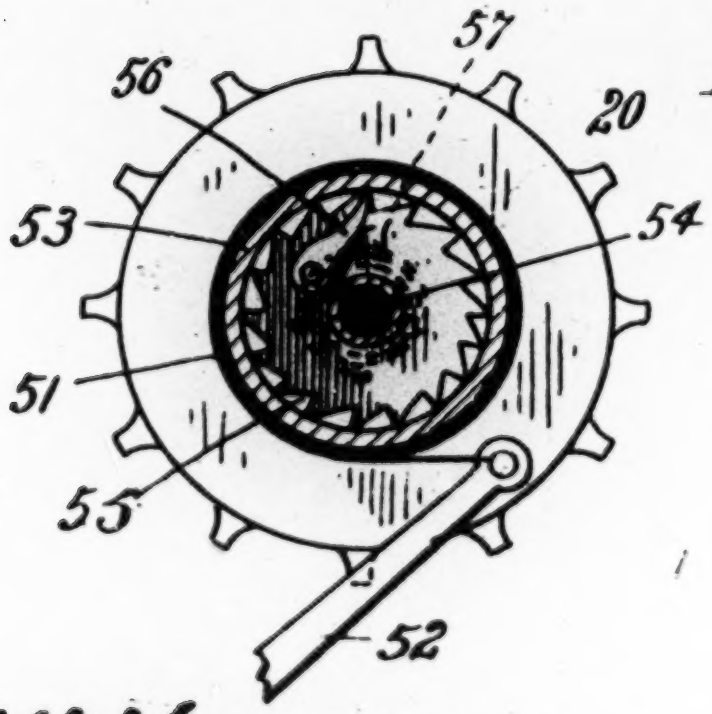
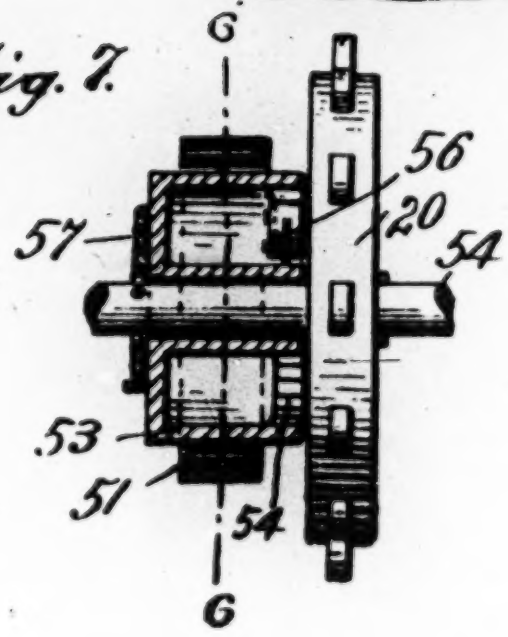


Fig. 7.



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UNITED STATES PATENT OFFICE.

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MAIL-SERVICE APPARATUS.

SPECIFICATION forming part of Letters Patent No. 699,408, dated May 6, 1902.

Application filed March 13, 1899. Serial No. 708,984. (No model.)

To all whom it may concern:

Be it known that I, GEORGE ALFRED OWEN, a citizen of the United States of America, and a resident of Springfield, in the county of Hampden and State of Massachusetts, have invented certain new and useful Improvements in Mail-Service Apparatus, of which the following is a full, clear, and exact description.

This invention relates to provisions for facilitating the mail-service in apartment-houses and other buildings, and contemplates means whereby mail-matter to be delivered into various apartments on different floors of the building may be placed in a suitable conveyer or elevator by the porter or other person at the lower floor, and whereby the same after being elevated to the proper floors is automatically discharged into the room, and, furthermore, whereby an audible signaling of such delivery may be accomplished.

The invention consists in the provisions and arrangements of means and the constructions and combinations of parts cooperating for the desired effects, all substantially as will hereinafter fully appear and be set forth in the claims.

Reference is to be had to the accompanying drawings, in which an exemplification of means for carrying out my invention is shown, and in which—

Figure 1 is a perspective view showing the corridor or entrance or reception-hall of an apartment-house or other building, wherein is shown the lower end of a combined hoistway for letters to be delivered to the occupants of the different floors of said building and the mailing-chute, together with the detachable portable receiver for the letters or other mail-matter, to be finally mailed in an adjacent street letter-box. Fig. 2 is a sectional view vertically through the hoistway, showing the elevating and self-discharging mechanism for the letters for delivery at different floors of the building, the mailing-chute also being shown, as is also a portion of the mail-receiving box at the lower end of the hoistway or well in which the mailing-chute is by preference located. Fig. 3 is a vertical sectional view taken on a plane at right angles to Fig. 2 through the lower portion of the hoistway and the mailing-chute. Fig. 4 is a perspective view showing the interior of a portion of the hoistway for the elevating mail-conveyer and the delivery-opening communicating with the apartment, upwardly past which the hoistway extends, this view illustrating the method of releasing the letters to be discharged through said opening at the correct instant. Fig. 5 is a perspective view of the portion of the mechanical elevating mail-carrier as seen at the opposite side from that shown in Fig. 4. Fig. 6 is in part a face view and in part a vertical sectional view transversely of the axis of rotatable actuating mechanism employed for imparting the progressive movement to the mechanical mail-carrier. Fig. 7 is a sectional view on the plane of the axis of the part shown in Fig. 6, and in this figure 6 6 is the section-line indicating the plane on which the preceding figure is taken.

The same or corresponding parts are designated by like characters throughout the drawings.

In the drawings, A represents a suitably-constructed well or hoistway in the building, in which way is inclosed the elevator or mechanical mail-carrier B for the letters to be delivered, respectively, through openings, such as shown at *a*, Figs. 2 and 4, in the side of the hoistway, which openings communicate into apartments on different floors one above another in the line of the elevator-way. The hoistway A, comprised within the suitable vertical casing, preferably of metal, has at its lower portion, which is in the reception-hall or entrance of the apartment-house, as indicated in Fig. 1, the opening through its side, (shown at *b*,) for which is provided the hinged door *c*. The elevating device (represented by the general letter B) will be now described in respect of its details.

20 and 22 represent support and drive wheels suitably journaled, one at the bottom and the other at or near the top of the way A, around which runs the suitably long endless chain 23 or other flexible support for the letter-holders *d*, each of which consists in the back 24, having the lower portion 25 thereof outwardly

turned at an obtuse angle to the upper portion, which is riveted or otherwise suitably attached to the widened lugs 27, formed on or fixed to a link of the carrier-chain, and the opposite member 28, which bears against the back member with a yielding pressure and is adapted to be opened for the insertion of a letter or letters between it and such back. As shown, the main or back member of the letter-holder has the forwardly-extending ear-pieces 29, constituting the supports for the journal-rod 30 of the movable member 28 of the holder, the spring 32 being applied in a well-known manner as common in various forms of clips or clamps for maintaining the same closed.

33 represents the operating extension for the clip.

The journal-rod 30 has at its end a comparatively short lever-arm 34, to coact with which is a fixed stud or abutment provided in a suitable position in the hoistway adjacent the path of the lever-arm. As shown in Fig. 2, at the lower portion thereof, the lever-arms 34 for the several letter-holder clips are of different lengths, the upper one being shorter than the one next below, each lower one being slightly longer than the preceding, so that each letter-holder will not be automatically opened until it has reached the opening *a* in the hoistway at the particular floor to which such holder corresponds.

Extending from the lower edge of the opening *a* in the hoistway is a shelf 37, slanting downwardly and outwardly into the room, having at its lower edge the ledge 38, and this shelf has at its rear edge the sectional member 39, forming a continuation of the shelf inclining upwardly into the way A. Said hinged shelf extension has the limiting lug 40, against which operates the spring 42. This said extension provides that when the letters are released from the letter-holder they will be guided down onto the shelf proper. The portion of the shelf down onto which the letters pass is provided with the slot 43, through which projects the light spring-contact 44 and adjacent which is the fixed contact 45. These contacts are comprised in a normally open circuit, constituted by the wiring 46, in which is connected the local battery 47 and the signaling-bell 48 with the usual form of vibrating striker, all so that when a letter comes down on the shelf it forces spring 44 onto contact 45, closing the circuit and ringing the bell to notify the occupant of the apartment into which the letter is delivered of the arrival thereof. The shelf extension is hinged, as shown, for the purpose of giving way to the letter-holders as they successively pass it.

After the porter or other attendant has placed the mail-matter properly in the respective letter-holders of the carrier through lower opening *b* he gives a progressive motion to the carrier-chain by reciprocating the lever 49. The lever is fixed on the rock-shaft 50, which is provided with the lever-arm 52, located within the hoistway and having attached to its free swinging end the strap 51, which has a winding arrangement around, and connection with, the cylindrical shell or drum 53, loose on the arbor 54 for sprocket-wheel 20. The drum 53 is provided internally with the ratchet-teeth 55, which engage to force in one direction the spring-pawl 56 on the sprocket-wheel. The spring 57 imparts the reversed motion to the drum. Each time the lever 49 is swung in the forward direction it, through the strap, rotates the drum, forcing by the ratchet-wheel engaging the sprocket-wheel pawl the ratchet-wheel forward. Then as the lever 49 is reversely swung and the strap slackened the drum by its spring is reversely rotationally moved, the ratchet-teeth clicking past the pawl to be in readiness for the repetition of the stated action derived from the swinging impulse of the lever 49. The letter-holders after being elevated to the top of the building pass around the upper sprocket-wheel 22 and then return to and around the lower sprocket and assume their positions opposite the opening *b* for the reception of the next several letters to be respectively placed therein for upward transmission and automatic delivery, as before.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a mail-service, the combination of a hoistway, a carrier movable therein; a plate secured to the carrier and having an inclined deflecting portion, a clamping member pivoted to the plate transversely of the carrier; means for retaining the clamping member in its closed position; an arm on the clamping member extending transversely to the carrier; and means located in the hoistway for tripping said arm and thereby opening the clamping member.

2. In a mail-service, the combination of a hoistway, a carrier movable therein; the plate, 24, secured to the carrier and having the inclined deflecting portion 25; the clamping member, 28, pivoted to the plate, 24, transversely of the carrier; means for retaining the clamping member in its closed position; the arm, 33, on the clamping member extending transversely to the carrier; and means located in the hoistway for tripping said arm and thereby opening the clamping member.

3. In a mail-service, a building having the hoistway, wheels 20 and 22 therein and an endless flexible carrier around said wheels, letter-holders mounted on said flexible carrier, and the journal-shaft 54 on which the said wheel 20 is mounted, the rock-shaft 50 and means for rocking it, and connections between said rock-shaft and said shaft 54 for imparting from the rocking movement of the former a step-by-step motion to the latter, for the purpose set forth.

4. In a mail-service in combination, the hoistway having the upper and lower wheels 22 and 20, the shaft 54 on which the latter is fixed, the rock-shaft 50 having the operating-lever 49 and the lever-arm 52, the drum 53 provided with the ratchet-teeth and the reversing-spring 57, and the strap 51 secured to said arm 52 and having a winding engagement around said drum, and the spring-pawl mounted on the wheel 20, as shown.

Signed by me at Springfield, Massachusetts, this 27th day of January, 1899.

GEORGE ALFRED OWEN.

Witnesses:

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M. A. CAMPBELL.

J. J. CURTIS.

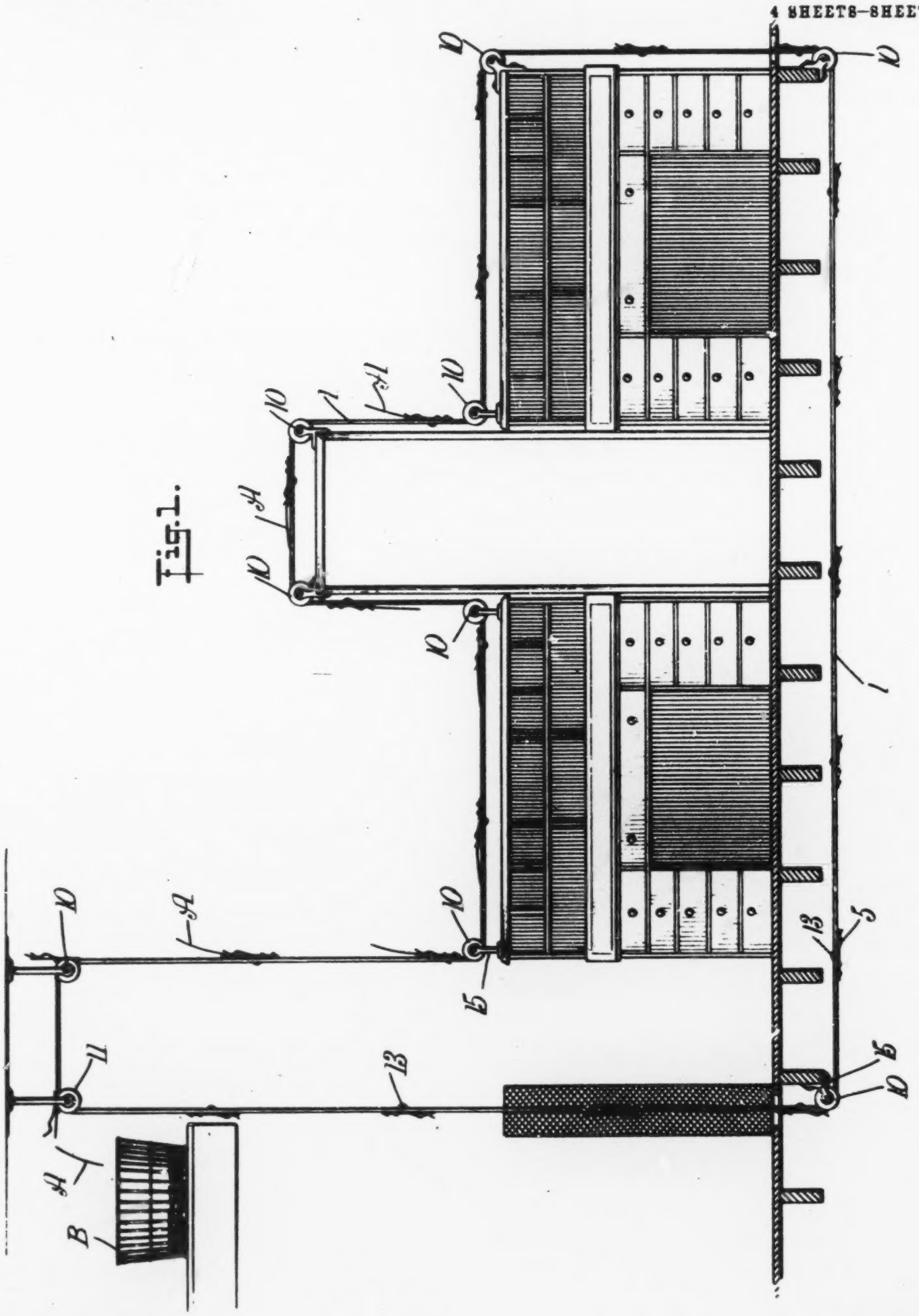
CONVEYER.

APPLICATION FILED NOV. 23, 1912.

1,079,218. Patented Nov. 18, 1913.

4 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

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4 SHEETS—SHEET 2.

Fig 2.

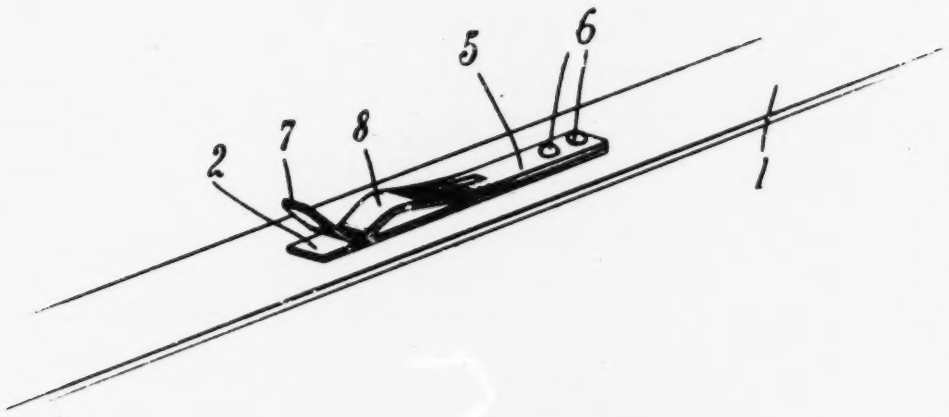
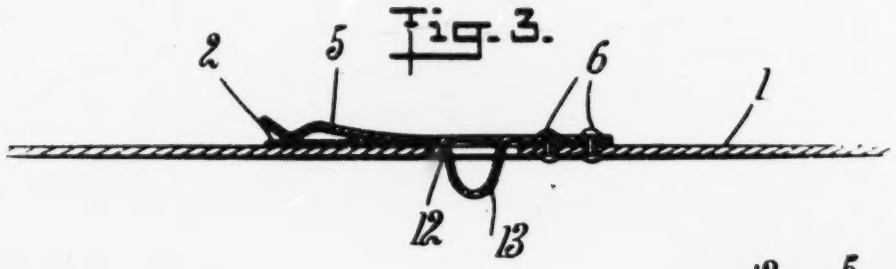


Fig. 3.



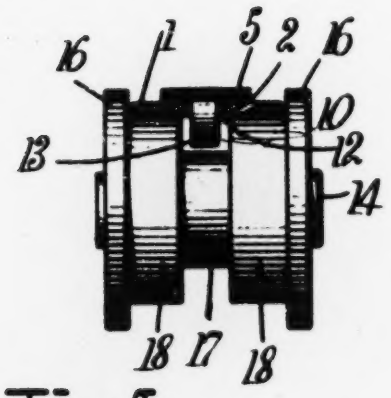


Fig. 4.

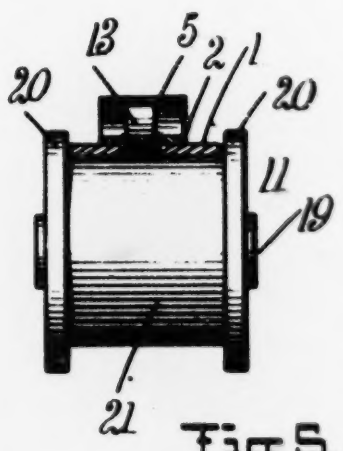


Fig. 5.

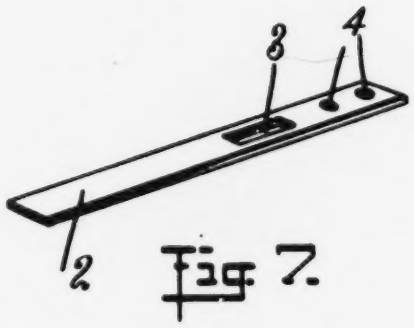


Fig. 7.

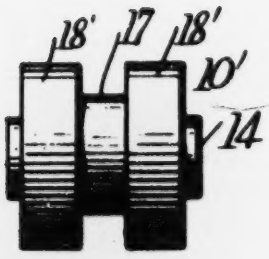


Fig. 6.

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4 SHEETS—SHEET 3.

Fig. 9.

Fig. 10.

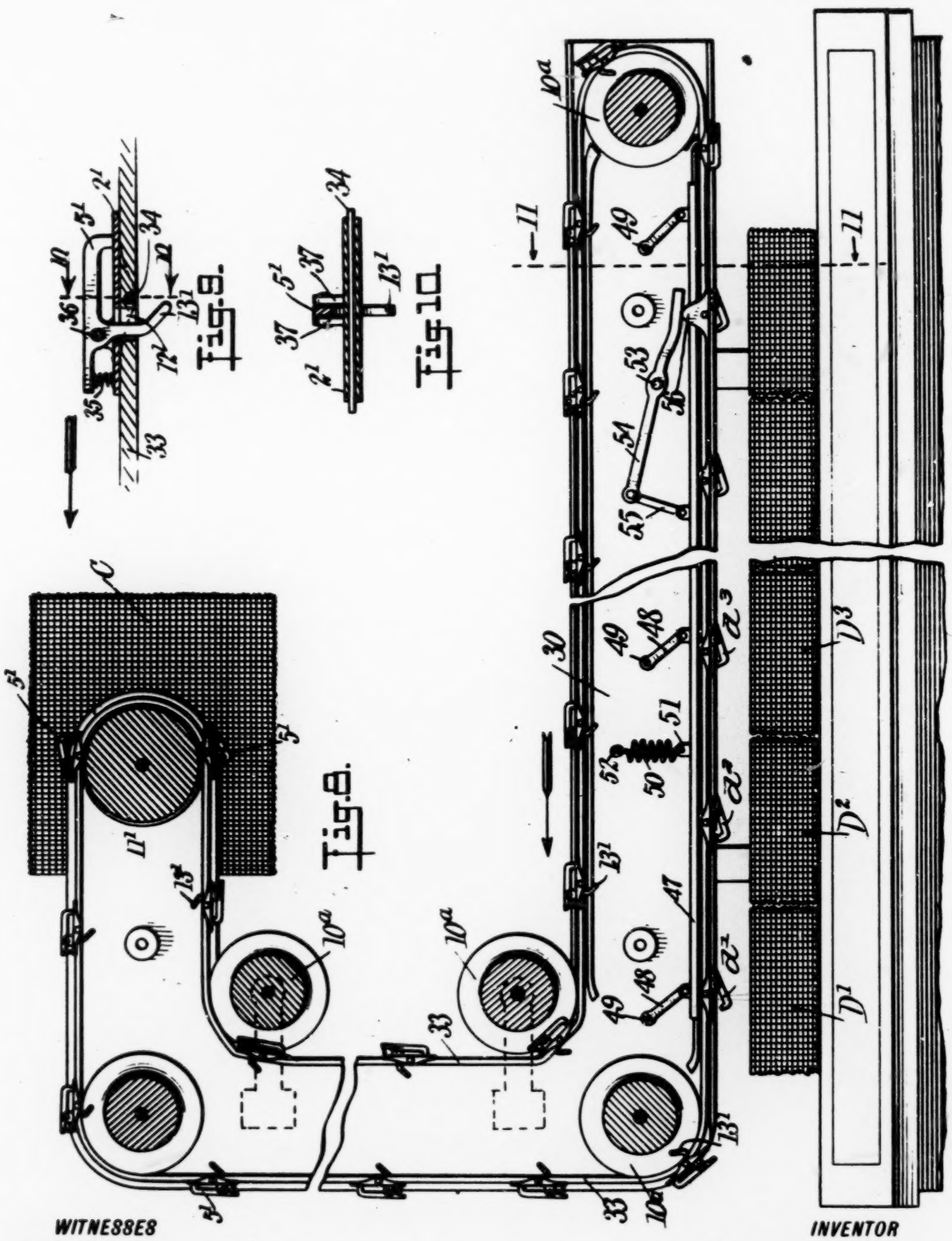

Fig. 8.

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4 SHEETS—SHEET 4.

Fig. 11.

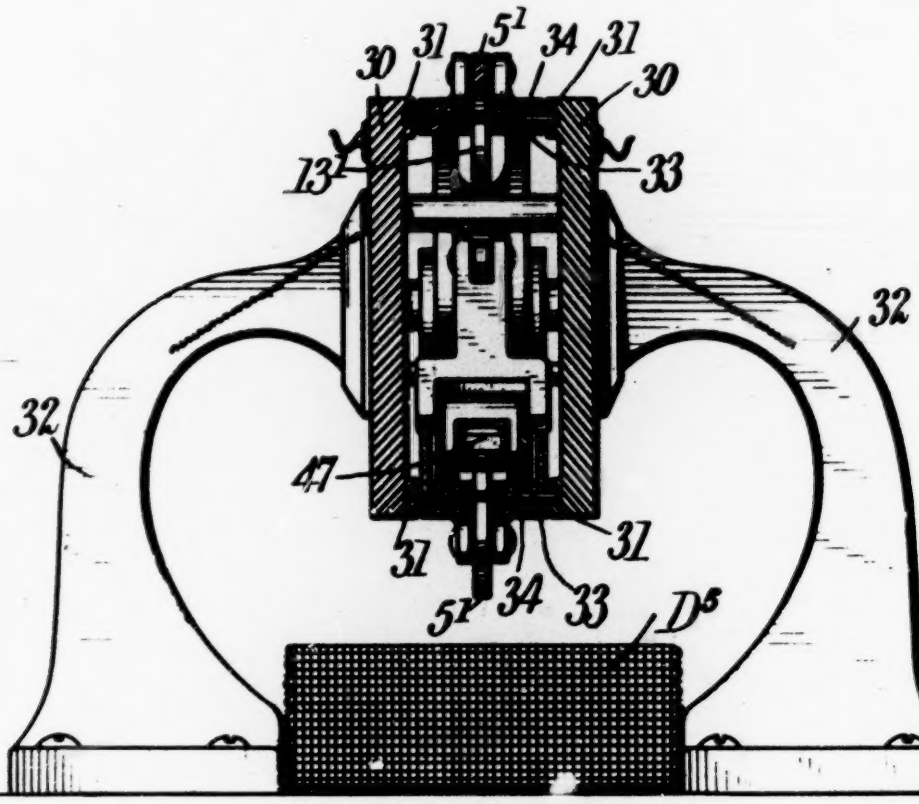


Fig. 12.

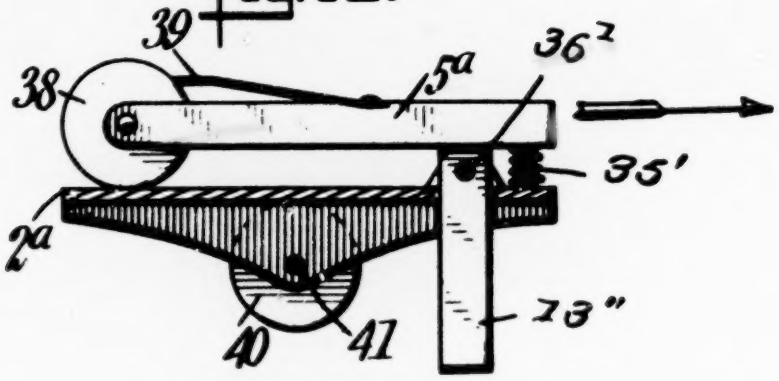
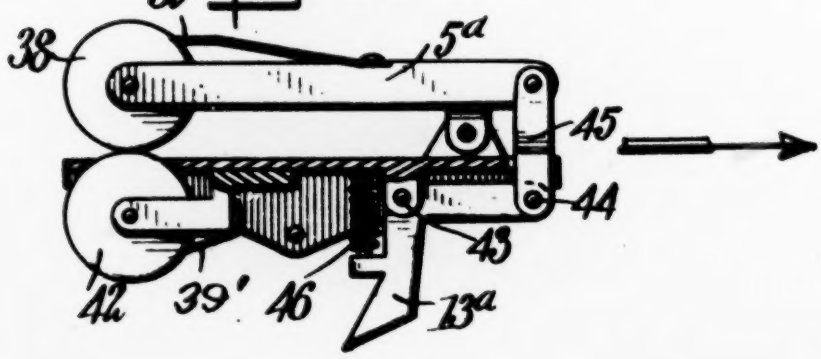


Fig. 13.



WITNESSES

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UNITED STATES PATENT OFFICE.

JAMES J. CURTIS, OF NEW YORK, N. Y.

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1,079,218. Specification of Letters Patent. Patented Nov. 18, 1913.

Application filed November 26, 1912. Serial No. 733,107.

To all whom it may concern:

Be it known that I, JAMES J. CURTIS, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Conveyer, of which the following is a full, clear, and exact description.

My invention relates generally to conveyers and more particularly it is directed to a new and improved construction especially adapted for transferring printed or written sheets from a number of places to a suitable receptacle, such as a basket or equivalent device.

One object of my invention is to provide a new and improved conveyer construction comprising essentially an endless belt or equivalent device with a plurality of clamps thereon, together with suitable pulleys or equivalent elements around which the belt passes, certain of the pulleys being so constructed that the printed sheets held in clamps are not displaced therefrom, there being another pulley for opening the clamp whereby the sheet carried thereby may be deposited in a suitable receptacle.

A further object of the invention is the production of a conveyer characterized by one or more series of selective clamps for holding printed or written sheets, with means for coöperation with the clamps, whereby a printed or written sheet carried by a certain clamp of any series will always be deposited in or at a certain one of a corresponding series of selective receptacles or stations.

Other objects and advantages of the invention will appear as the description thereof proceeds, the new and useful features being particularly pointed out in the appended claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which like characters of reference denote corresponding parts in all the views, and in which—

Figure 1 is a side view of a number of desks or stations with the conveyer system in operative position, the view shown indicating one use of the invention; Fig. 2 is a perspective view of a portion of the endless belt with one of the clamps thereon; Fig. 3 is a vertical longitudinal sectional view through the belt and the clamp; Fig. 4 is a side view of one form of pulley with the conveyer belt and clamp in operative relation thereto; Fig. 5 is another form of pulley with the belt and clamp in engagement therewith, the clamp being opened; Fig. 6 is a third form of pulley adapted to be used with the conveyer; Fig. 7 is a perspective view of the inner element of the clamping device, Fig. 8 is a side view of a modified construction, showing means whereby a sheet carried by one of the clamps will always be deposited in a given receptacle; Fig. 9 is a vertical sectional view of the conveyer, showing the modified clamp; Fig. 10 is a vertical sectional view on the line 10—10 of Fig. 9; Fig. 11 is a vertical sectional view on the line 11—11 of Fig. 8; Fig. 12 is a partial vertical sectional view of another form of clamp, the view being from the opposite side of the belt from that of Fig. 9, and Fig. 13 is a similar view of still another form of clamp.

The conveyer system herein described and claimed may be made in various lengths and may be adapted to a variety of uses.

Fig. 1 illustrates the system in use in an office, such as a newspaper or telegraph office, the use of the device being to transmit copy from various desks to a common station or receptacle, such as a basket, the copy being deposited in the basket, suitable means being provided for releasing the copy from the clamping device carried on the conveyer belt. The belt 1, which may be of any suitable material, is flexible, whereby it may pass around a number of pulleys, the clamps, a plurality of which are secured to the belt by suitable means, being adapted to be made of stampings, whereby a structure of low cost is provided. Each clamp is made up of an inner element 2, preferably provided with a slot 3 intermediate of its ends, together with a number of openings 4 adjacent one end; the outer element 5 of each clamp is provided with suitable recesses adjacent one end adapted to receive fastening devices 6 passing also through the openings 4 in the inner element of the clamping device and through the belt, whereby the two elements are held in position, normally in contact, as shown particularly in Fig. 2.

The outer element 5 has its free end 7 preferably outturned, and the intermediate portion 8 also preferably bent as illustrated, whereby lifting of the outer end of the element will permit any written or printed

matter, hereinafter referred to for convenience as messages, to be securely positioned between the two elements 2 and 5 of the device. The width of the belt 1 may be varied to accommodate messages of different dimensions.

The belt 1 is designed to pass around a number of pulleys 10, the construction of these pulleys being such that the messages carried by the clamps are retained in position while passing around, Figs. 4 and 6 illustrating the particular form of these pulleys. A different form of pulley 11 is so constructed that, as a clamp passes thereround, the two elements 2 and 5 of the clamp will be separated, thereby permitting any messages A carried by the clamp to be dropped into a receptacle or at a station represented by a basket B. In order to provide for this automatic operation, a particular form of outer element 5 is made use of which will now be described.

Referring particularly to Fig. 3, it will be noted that when the inner element 2 is secured in position on the belt 1, a slot 12 in the belt registers with the slot 3 in the element 2, the outer element 5 being provided with an inwardly extending arm 13 of such dimension that it freely passes through these registering slots; as shown in Fig. 2, this arm 13 may be made a portion of the outer element 5 of the clamp, the stamping process in making the clamp also providing the arm.

The roller 10, which is suitably supported on a shaft 14 mounted between suitable fixed arms 15 forming brackets, may be provided with flanges 16, the intermediate portion of the roller being recessed as at 17; to permit the clamp to pass around the roller without the elements thereof being separated. The pulley 11 is also provided with a shaft 19 mounted in similar fixed arms 15, this pulley having peripheral flanges 20, and all of the portion 21 of the roller between the flanges being substantially at the same distance from the axis of rotation, as shown particularly in Fig. 5; with this form of roller, the passage of the belt 1 therearound will bring the arm 13 of the outer element 5 of the clamp into engagement with the portion 21, whereby the outer element 5 will be moved away from the inner element 2, the message carried by the clamp being thereby released at the station B. The flanges 16 may be omitted, and the roller 10′ shown in Fig. 6 may be used in lieu of the roller 10.

The length of the conveyer may vary widely and the number of clamps thereon may also be varied in order to adapt the structure to different uses; it is also clear that by the use of a large number of rollers variously positioned such conveyer may traverse great distances, the inventive idea, however, being unchanged.

Referring particularly to Figs. 8 and 11, the supporting structure for the conveyer comprises spaced sides 30 provided with grooves or passageways 31 in the opposing faces thereof, the sides being supported in position in any suitable manner, as by means of standards 32. In this instance the endless belt 33 has extending transversely thereof and beyond the edge portions guides 34 which operate in the said passageways 31, whereby the path of the belt is determined. The rollers 10ª in this instance are substantially similar to the rollers 10 or 10′ shown in Figs. 4 and 6, and are similarly constructed for a similar purpose; the roller 11′ is similar in structure and purpose to the roller 11 shown in Fig. 5, and is positioned adjacent the station C so that messages carried by any of the clamps on the belt will be deposited there.

Referring particularly to Figs. 9 and 10, the clamp is substantially the equivalent of the clamp shown in Fig. 3, the belt 33 being provided with a slot 12′ similar to the openings 12, through which the arm 13′ carried by the outer part 5′ of the clamp projects; the inner part 2′ of this clamp is secured to the belt in any desirable manner, and the two parts of the clamp are retained in engagement by means of a helical spring 35 engaging adjacent ends of the said parts, this spring being the equivalent of the inherent resiliency of the part 5 of the clamp shown in Fig. 3. The outer part 5′ of the clamp may be mounted on the inner part as by means of a pin 36 having its ends secured in the ears 37 carried by the inner part 2′.

The manner of operation of the parts thus far described in connection with Figs. 8 to 11 is substantially similar to that set forth in connection with Fig. 1; that is, the station C has deposited there all the messages carried by the different clamps by reason of the peculiar construction of the roller 11′ which engages the arm 13 of each.

Referring particularly to Fig. 12, whereby a modified form of clamp is shown, it will be noted that this structure differs from that shown in Fig. 9 in the provision of a wheel 38 carried by the outer member 5ª, and bearing against the outer surface of the inner member 2ª, the wheel being freely movable in one direction, as when it is desired to insert a message between the wheel and the inner part, movement of the wheel in the opposite direction being prevented by a spring pawl 39 having its outer end bearing against the periphery of the wheel. This form of clamp may also be provided with rollers 40, carried by the inner part 2ª and mounted on the ends of a spindle 41, and adapted for operation in the passageways 31 as the conveyer operates, thereby providing a rolling friction between the parts rather than a sliding friction as dis-

closed in Figs. 8 and 11. The arm 13'' in this construction is rigidly secured to the outer member 5^a of the clamp and through it said member is pivoted at 36' to the inner member. A spring 35' serves to normally maintain the wheel 38 in engagement with the inner member. As the conveyer belt carries the clamp along its journey, the inner end of the arm 13'' is brought into coöperation with the tripping mechanism whereby such end is moved toward the axis of the rollers 40 and the wheel 38 is swung outward with relation to the inner member.

The clamp shown in Fig. 13 is a modification of that shown in Fig. 12, and embodies the wheel 38 and the pawl 39, but a second wheel 42 coöperates with the first wheel 38 rather than the inner member 2^a; the wheel 42 is limited in its rotation in one direction by means of a spring pawl 39' which is similar to but shorter than the pawl 39 above described. A message introduced between the wheels 38 and 42 operates both of them freely in one direction, but the frictional grip between the wheels and the message will hold the message firmly under ordinary conditions until the clamp is opened in the prescribed manner. In this instance the arm 13^a which is engaged by the roller 11' in order to open the clamp, consists of a bell crank lever pivotally mounted at 43, the forward end of one arm thereof being pivotally connected at 44 to a link 45 which engages the front end of the outer part 5^a of the clamp. The pressure between the wheels 38 and 42 is maintained by means of the spring 46. The direction of movement of the parts shown in Figs. 8, 9, 12 and 13 is as indicated by the large arrows.

The structure shown in Figs. 8 and 11 contemplates that a message applied to and carried by a particular clamp of any series of selective clamps will be returned to or delivered at a particular station or receptacle; that is, the selective stations of a series, among which messages are to be distributed, may be known by number or distinguishing characters, such as D', D^2, etc., and each series of clamps may be correspondingly numbered or indicated, as by letters d', d^2, etc. The distinguishing characters appearing on or adjacent the several clamps, an operator at any convenient place along the line of the device, beyond the roller 11', desiring for instance to transmit a message for automatic delivery at say station D^2, will attach it to any clamp marked d^2 as it comes along. Referring particularly to Fig. 8, it will be noted that between the sides 30 of the supporting structure of the conveyer is a longitudinally extending bar 47 which is pivotally engaged with links 48 at the outer ends thereof, these links being pivotally mounted at 49 to the said sides 30; the bar 47 is maintained in an uppermost position by means of a spring 50, one end of which engages a suitable lug or boss 51 carried by the bar, the other end being fixed at 52 to the said side 30. In order to move the bar 47 at certain times the following structure is availed of: A lever pivoted at 53 between its ends has one arm 54 in pivotal engagement with a link 55 which is attached to the said bar; the other arm of this lever is free and is adapted to be engaged by a lug 56 carried by the belt when the lug comes in position as shown in Fig. 8, said lug 56 being pertinent to the series of selective clamps d', d^2, etc. The aforesaid stations D', D^2, D^3, etc., are spaced correspondingly to the spacing between clamps, so that all of the clamps of a series will always be opened simultaneously and deposit any messages carried thereby at the corresponding stations when the lug 56 comes into engagement with the arm of the lever acting upon the bar 47.

Having thus described my invention, I claim as new, and desire to secure by Letters Patent:—

1. The combination of an endless belt, a plurality of rollers, a plurality of clamps carried by the belt, each clamp embodying a plurality of members, one of which is provided with an inwardly extending arm, the intermediate portion of some of the rollers being removed whereby the arm may pass therearound and out of engagement therewith, together with another roller with which the inwardly extending portion is adapted to engage whereby the jaws of the clamp are moved away from each other relatively.

2. The combination of an endless belt, a plurality of clamps secured to the belt, each clamp being made up of two members, one of the members being provided with an inwardly extending arm, slots being formed in the belt through which the arms project, a plurality of rollers around which the belt passes, the intermediate portion of some of the rollers being removed, whereby the clamps may pass thereover, with the arms out of engagement with such rollers, and another roller with which the arms engage, whereby the jaws of the clamps are moved relatively from each other, whereby articles carried by the clamps may be released therefrom.

3. In combination with an endless belt and a series of selective clamps thereon, means for opening all of the clamps of such series when they come to certain selective stations corresponding to said clamps, substantially as set forth.

4. In a conveyer, the combination of an endless belt, a series of selective clamps carried by the belt in spaced relation to one another, a series of selective receptacles adjacent which the series of clamps are carried

by the belt, the receptacles being spaced to correspond to the spacing of the clamps in said series, and the receptacles being distinguishable according to the several clamps, and means for opening the clamps when they arrive adjacent the receptacles, each clamp of the series opening over its corresponding receptacle.

5. In a conveyer, a belt, a series of clamps connected to the belt, a series of receptacles along which said clamps are carried by the belt in a continuous operation, the several clamps of said series corresponding to the several receptacles each to each, and means causing all of the clamps of said series to open simultaneously when they arrive adjacent all of said receptacles.

6. In a conveyer, a belt, a plurality of clamps connected to said belt, and mechanism for causing said clamps to open simultaneously, said mechanism including a bar extending along the line of the belt and a lug carried by the belt serving to swing said bar toward the clamps.

7. In a conveyer, the combination of an endless belt, a clamp secured to and carried by said belt, said clamp comprising an inner member and an outer member spring pressed into normal clamping engagement with the inner member, said outer member having an arm projecting inwardly through the inner member and said belt, and means on the opposite side of the belt from the clamp acting upon said arm and serving to force it outwardly, causing the outer member of the clamp to move relatively away from the inner member against the force of the spring.

8. In a conveyer of the class set forth, the combination with an endless belt, of a series of rollers over which the belt operates, and a series of clamps connected to said belt, each of the clamps comprising an inner and an outer member, the inner member being connected to the belt and having an opening therethrough, the outer member being pivoted to the inner member and having means extending at an angle therefrom through said inner member opening and the belt and adapted to coöperate with one of said rollers, said outer member having a wheel journaled in its free end and constituting the gripping member in coöperation with the inner member, and means to limit the rotation of said wheel in one direction.

9. In a conveyer of the character set forth, the combination with an endless belt, of a plurality of clamps secured to the belt, a series of rollers over which the belt operates, each of said clamps comprising an inner member secured to the belt and having a wheel journaled adjacent one end thereof and also having an opening therethrough adjacent its opposite end, an outer member pivoted to the inner member and having a wheel journaled therein and adapted to cooperate with the wheel of the inner member, means associated with each of said wheels to limit its rotation in one direction, and means connected to the outer member and extending through the opening in the inner member to cause relative movement between the inner and outer members, and means arranged along the line of the belt to coöperate with said clamp member operating means.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES J. CURTIS.

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LAURENCE J. GALLAGHER.

F. H. COOK.

TOBACCO HARVESTER.

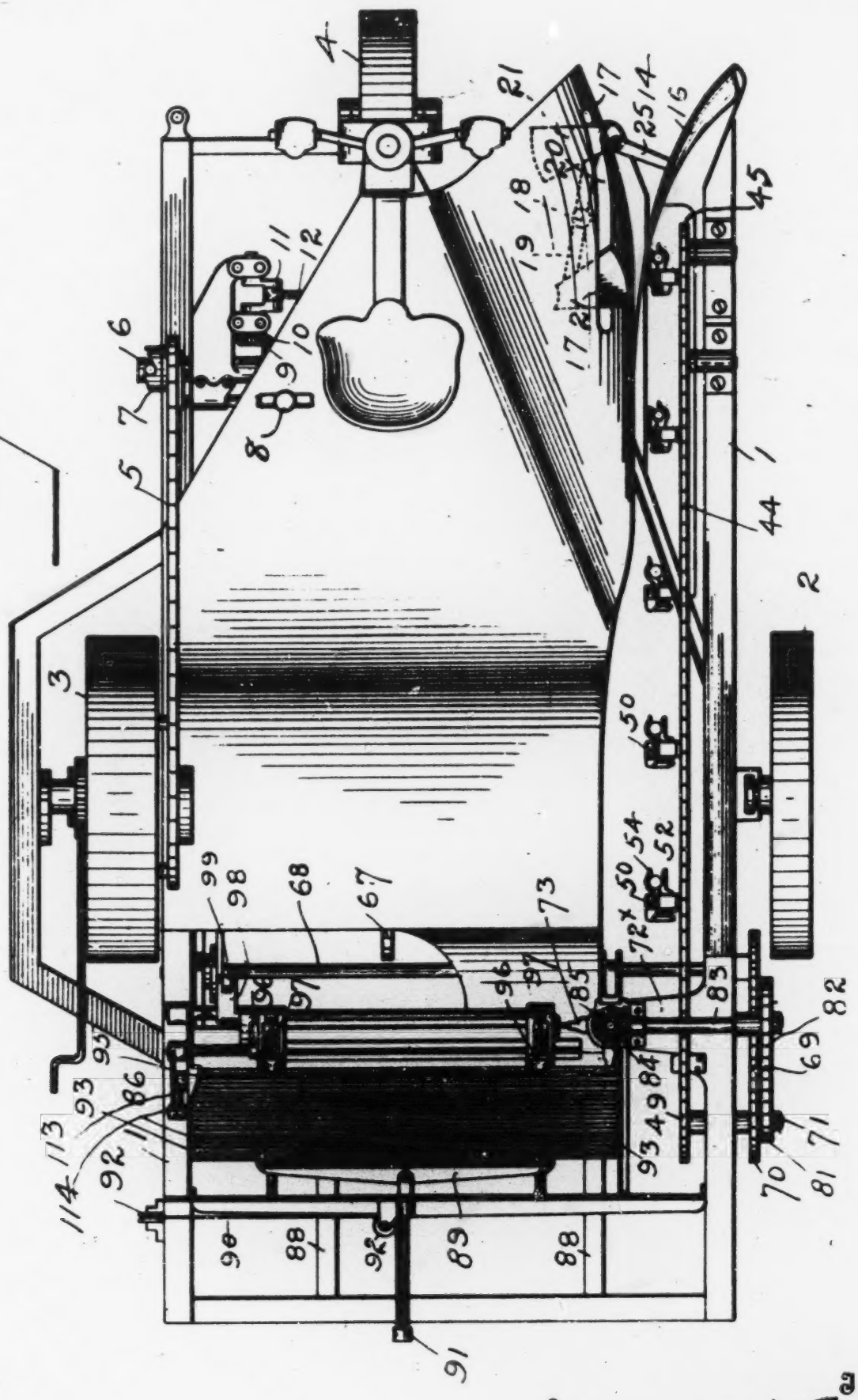
APPLICATION FILED MAR. 17, 1911.

1,134,184.

Patented Apr. 6, 1915.

12 SHEETS—SHEET 1.

Fig. 1



Witnesses

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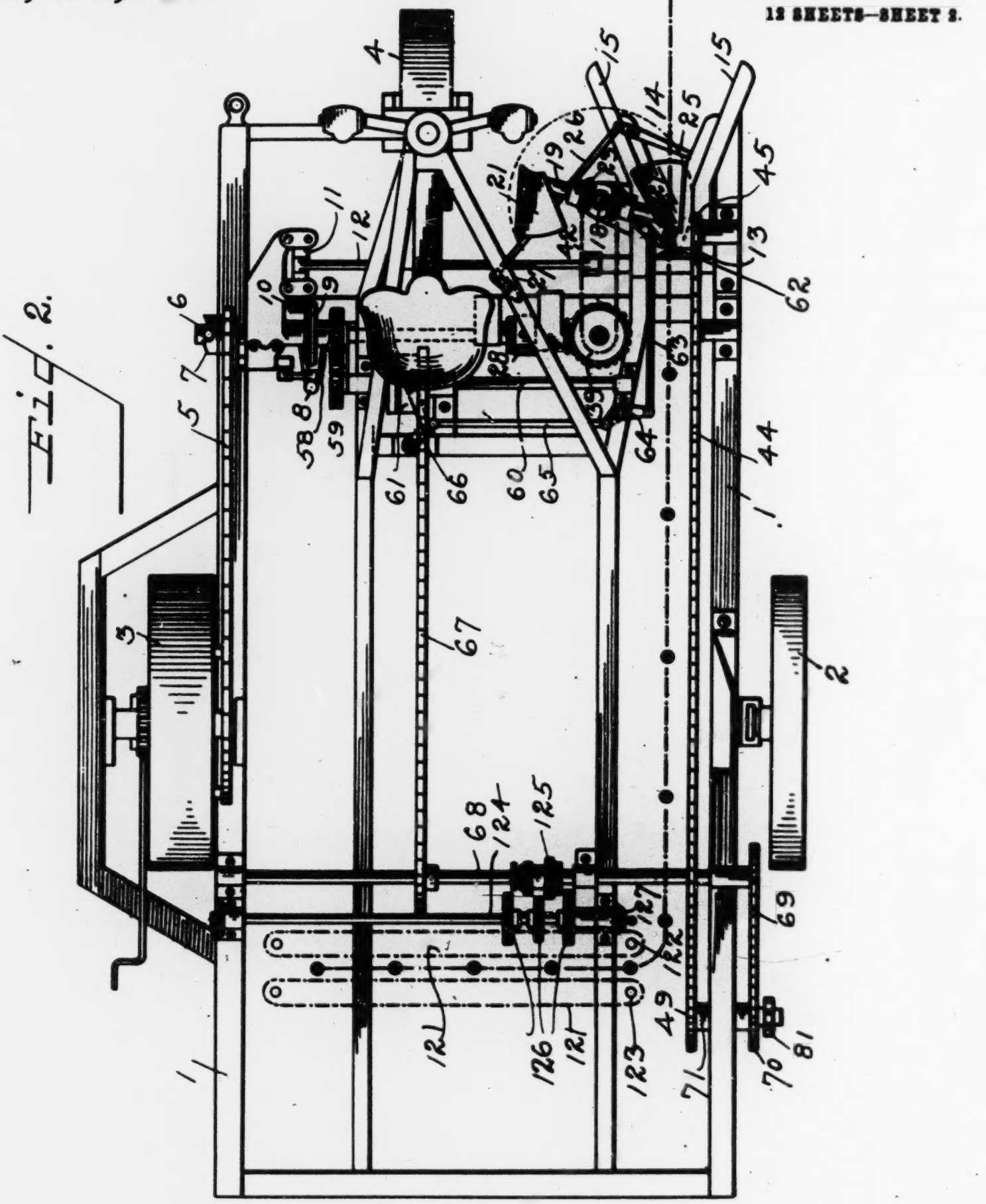
12 SHEETS—SHEET 2.

Fig. 2.



WITNESSES:

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12 SHEETS—SHEET 3.

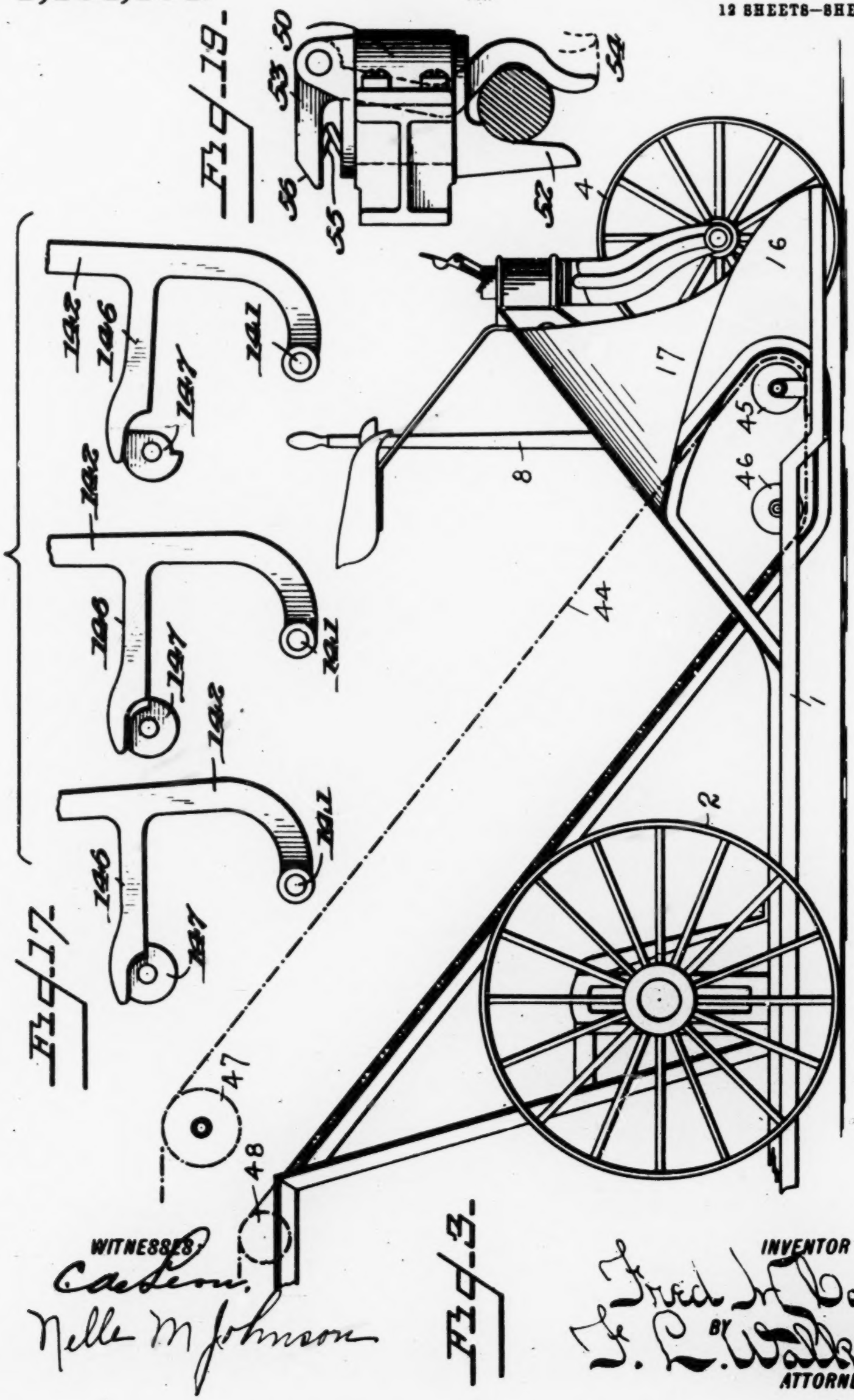

Fig. 12.

Fig. 17.

Fig. 13.

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12 SHEETS—SHEET 4.

Fig. 3a.

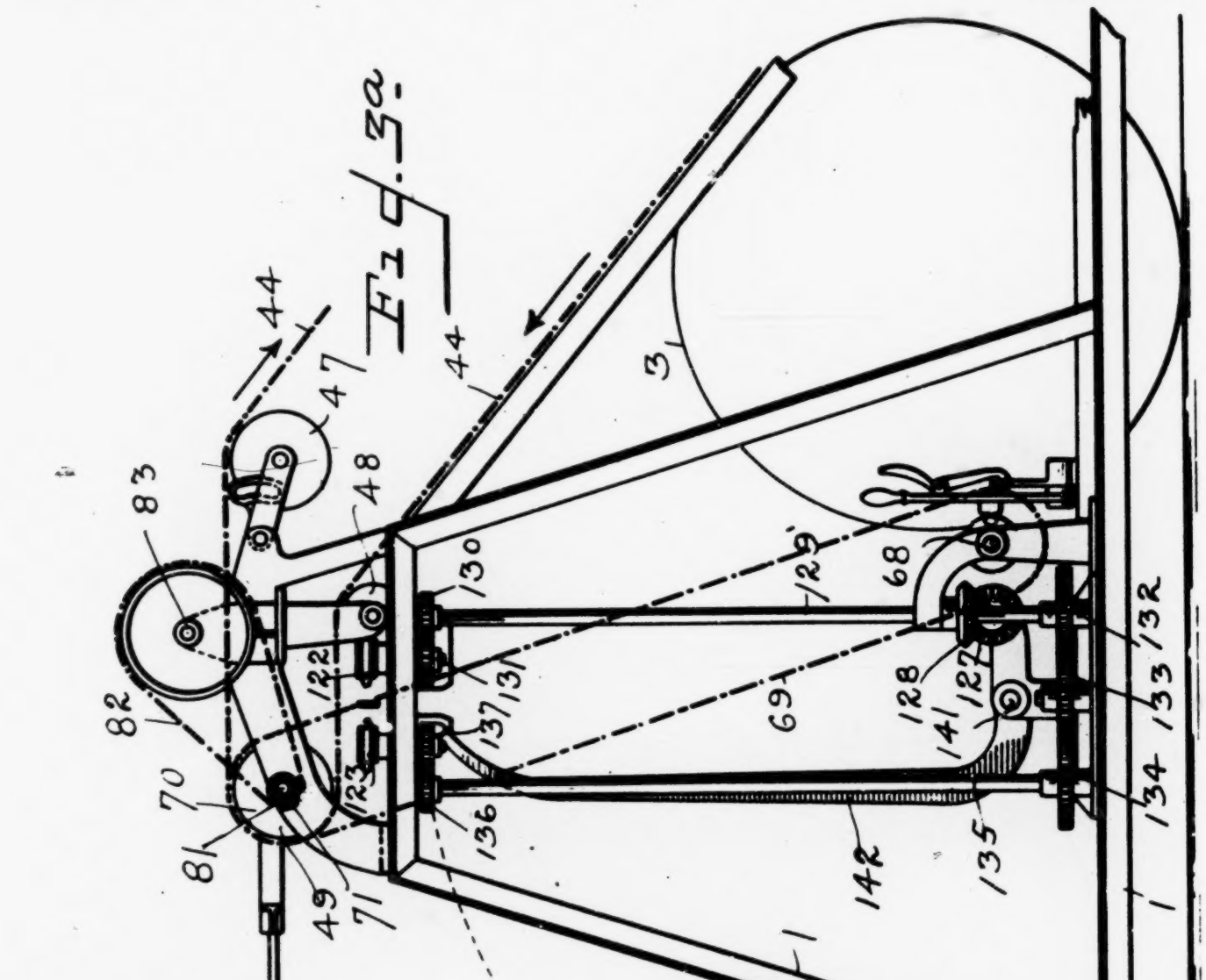

Fig. 1b.

Fig. 2b.

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12 SHEETS—SHEET 5.

Fig. 4.

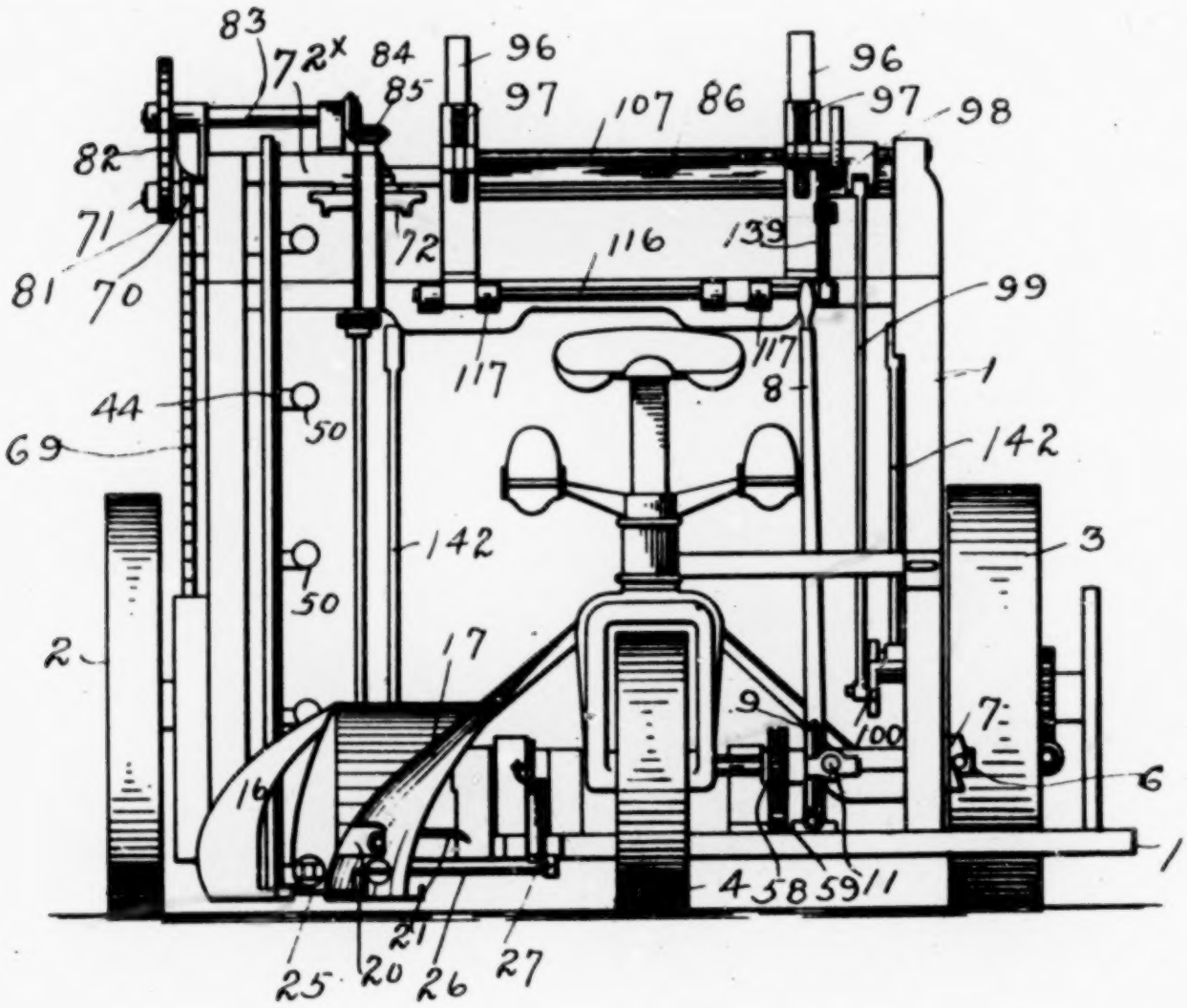
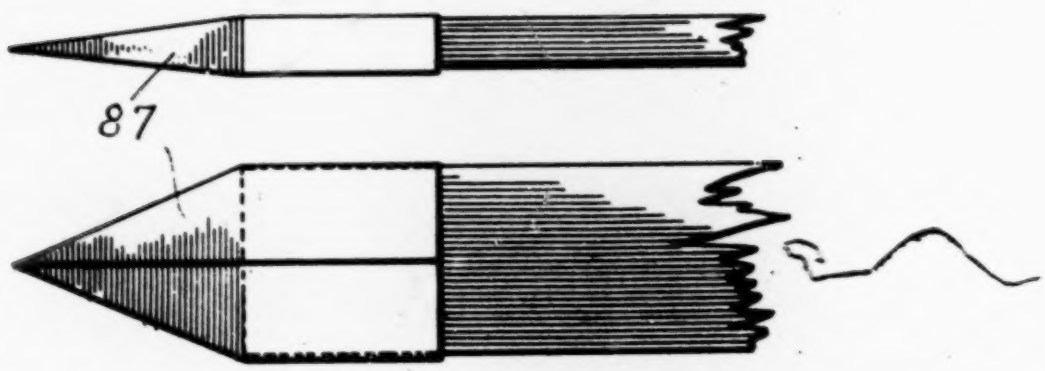


Fig. 18



Witnesses
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12 SHEETS—SHEET 6.

Fig. 5.

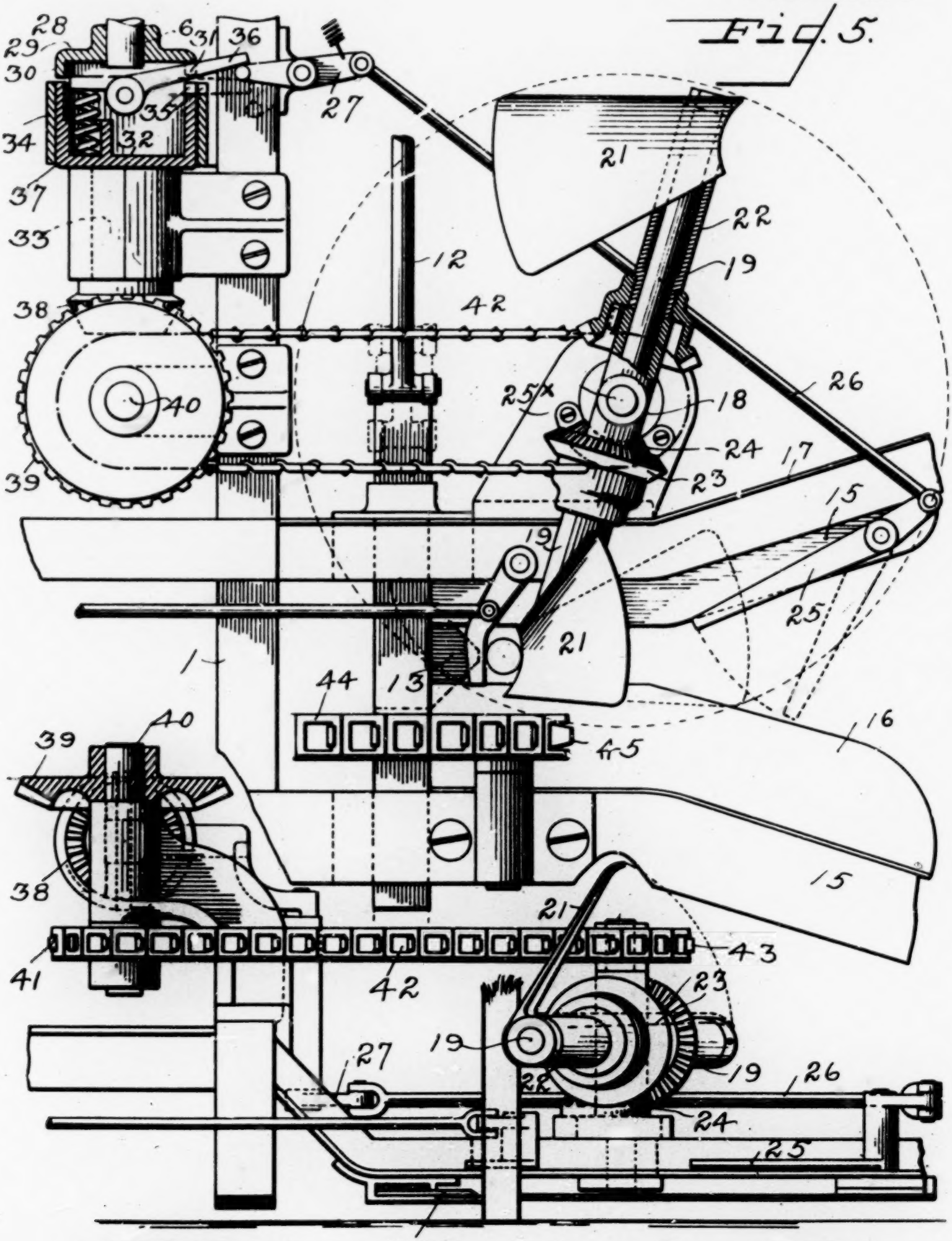

Fig. 6.

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12 SHEETS—SHEET 7.

Fig. 7.

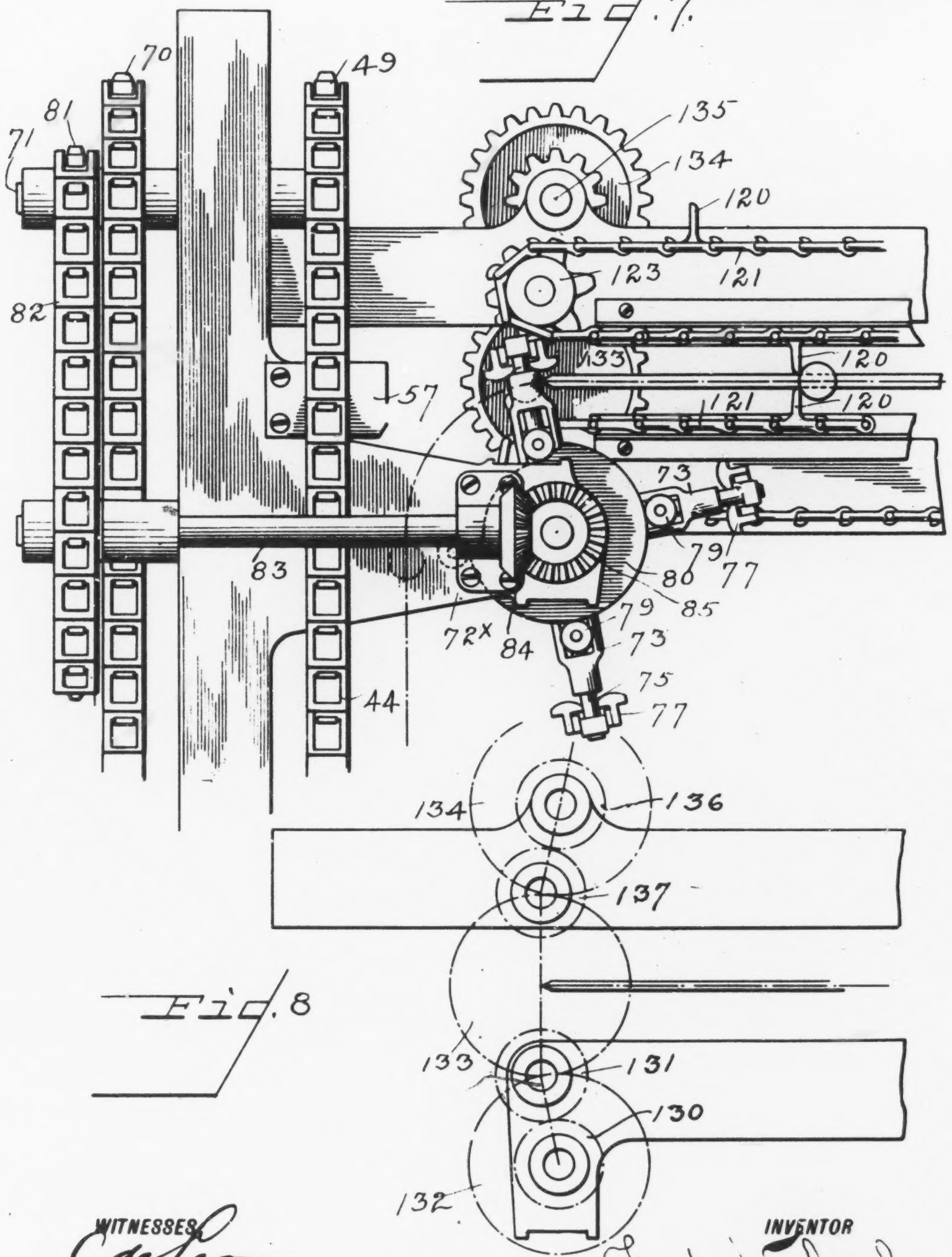

Fig. 8

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12 SHEETS—SHEET 8.

Fig. 9.

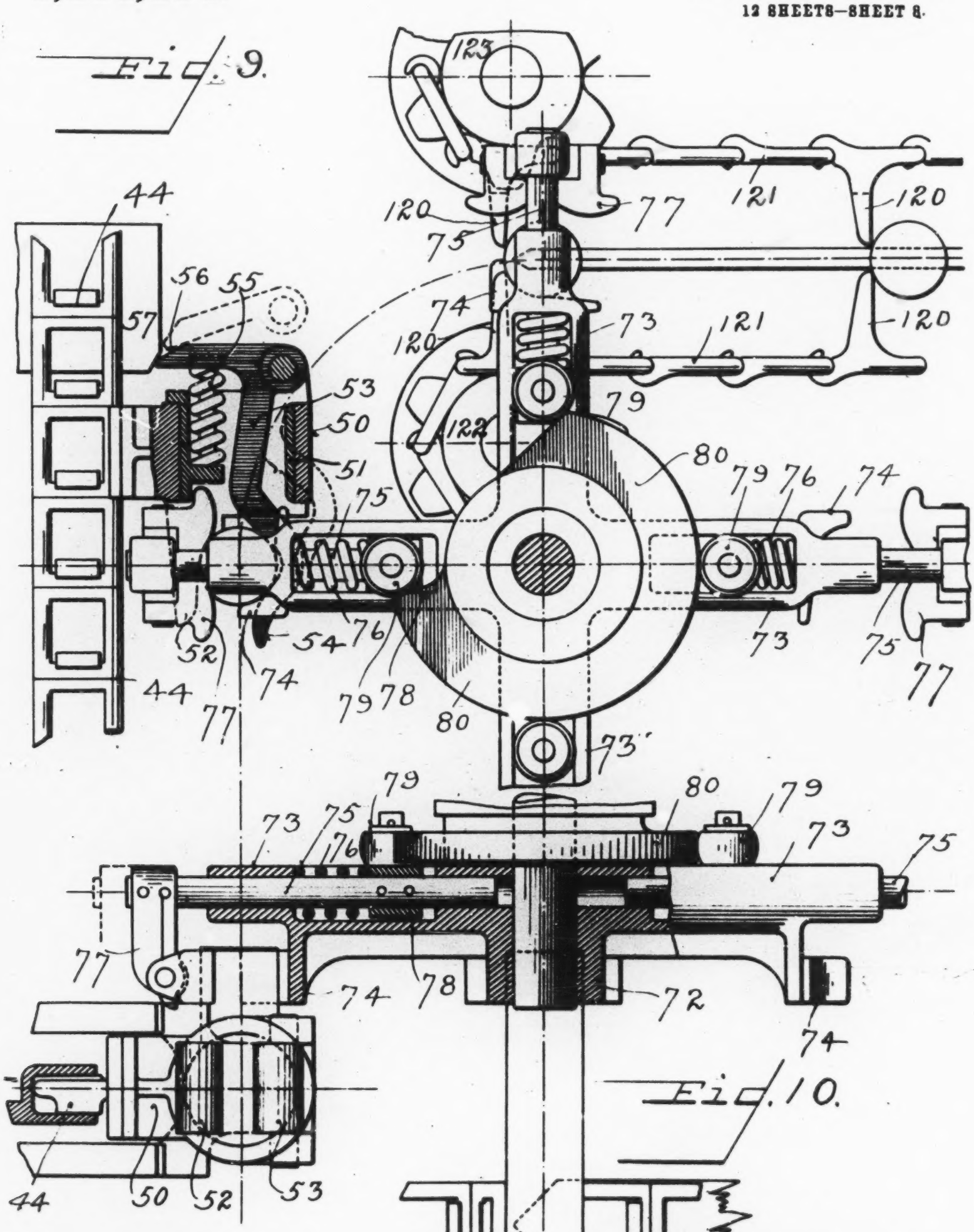

Fig. 10.

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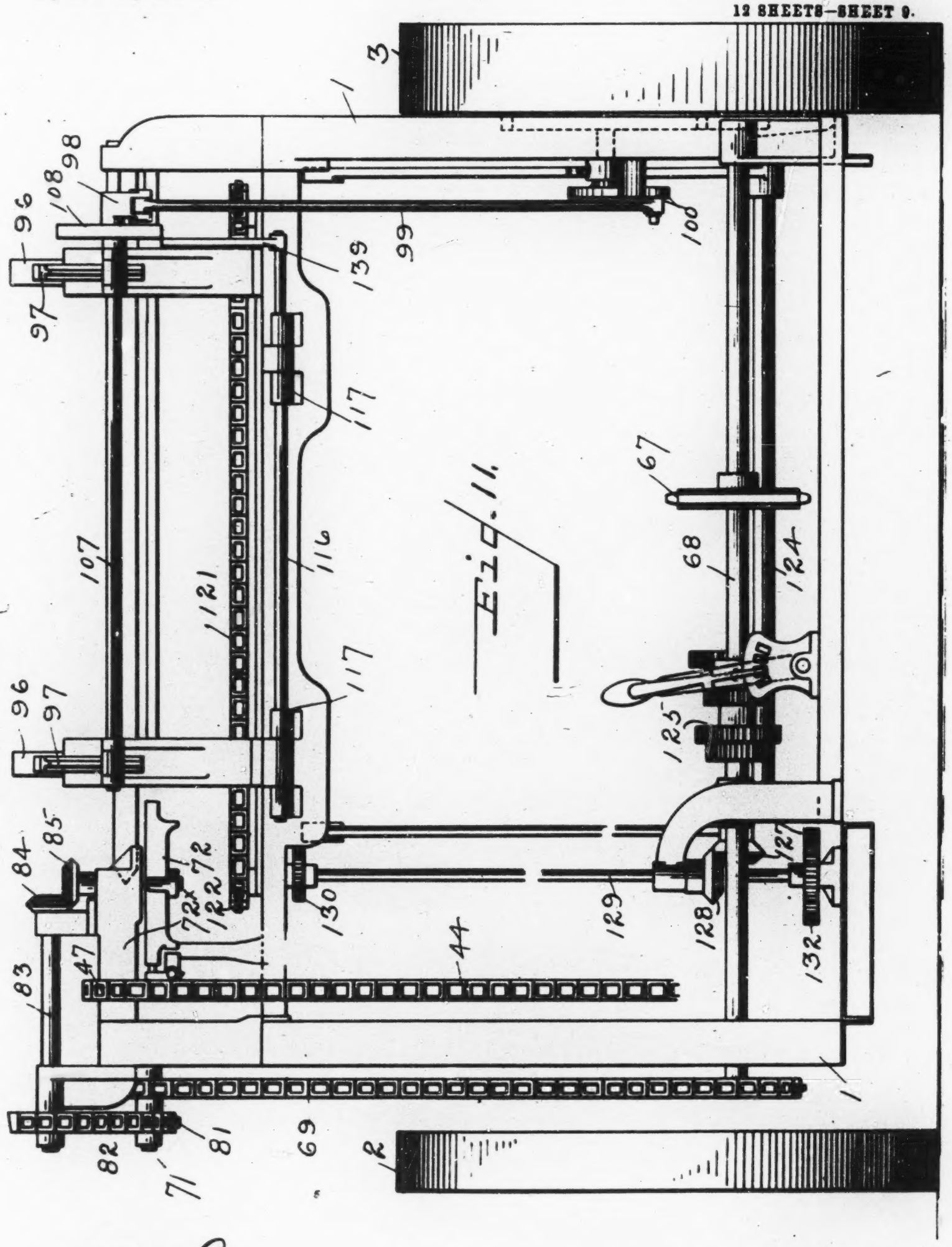
TOBACCO HARVESTER.

APPLICATION FILED MAR. 17, 1911.

1,134,184.

Patented Apr. 6, 1915.

12 SHEETS—SHEET 9.



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12 SHEETS—SHEET 10.

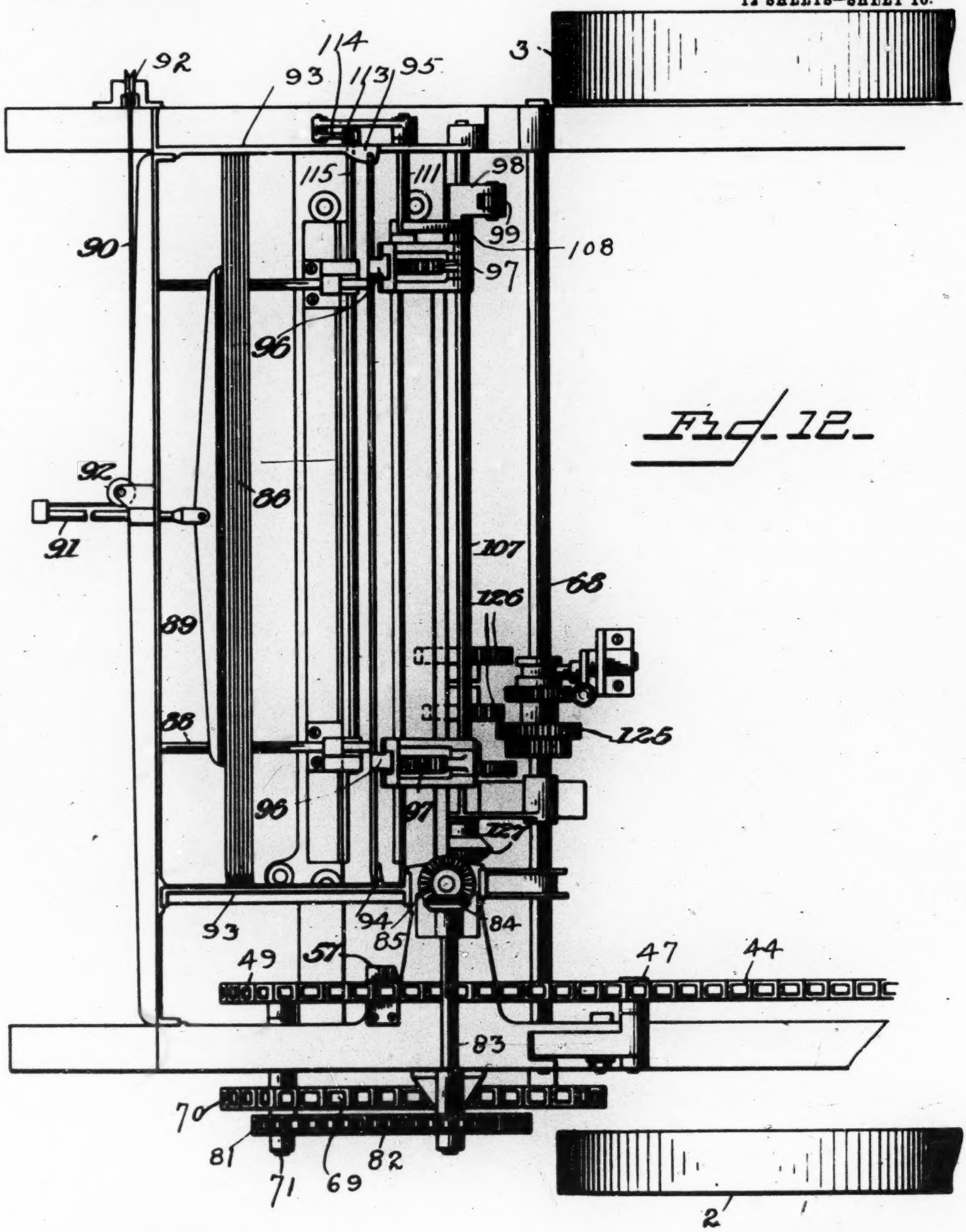

Fig. 12.

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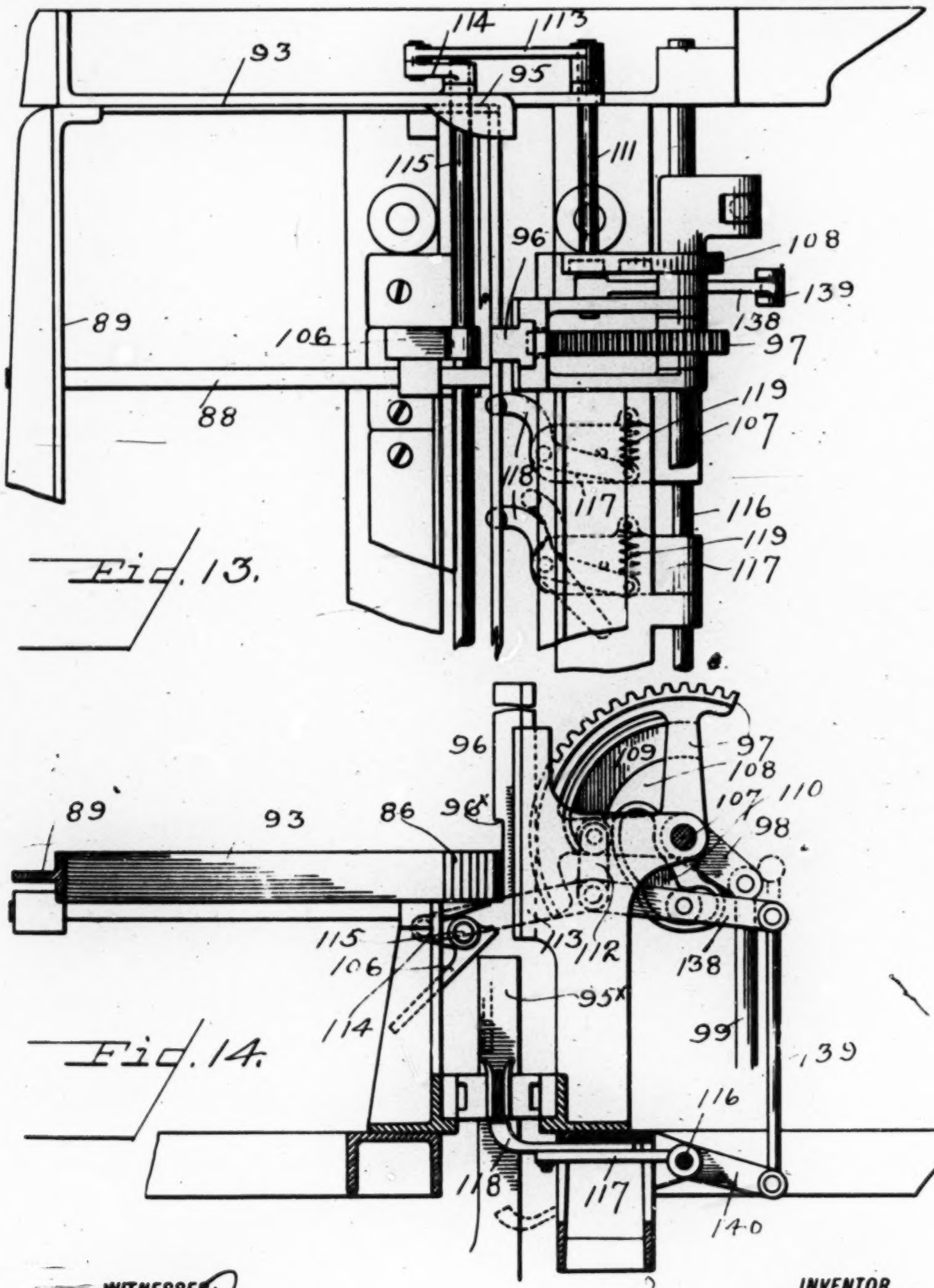

Fig. 13.

Fig. 14.

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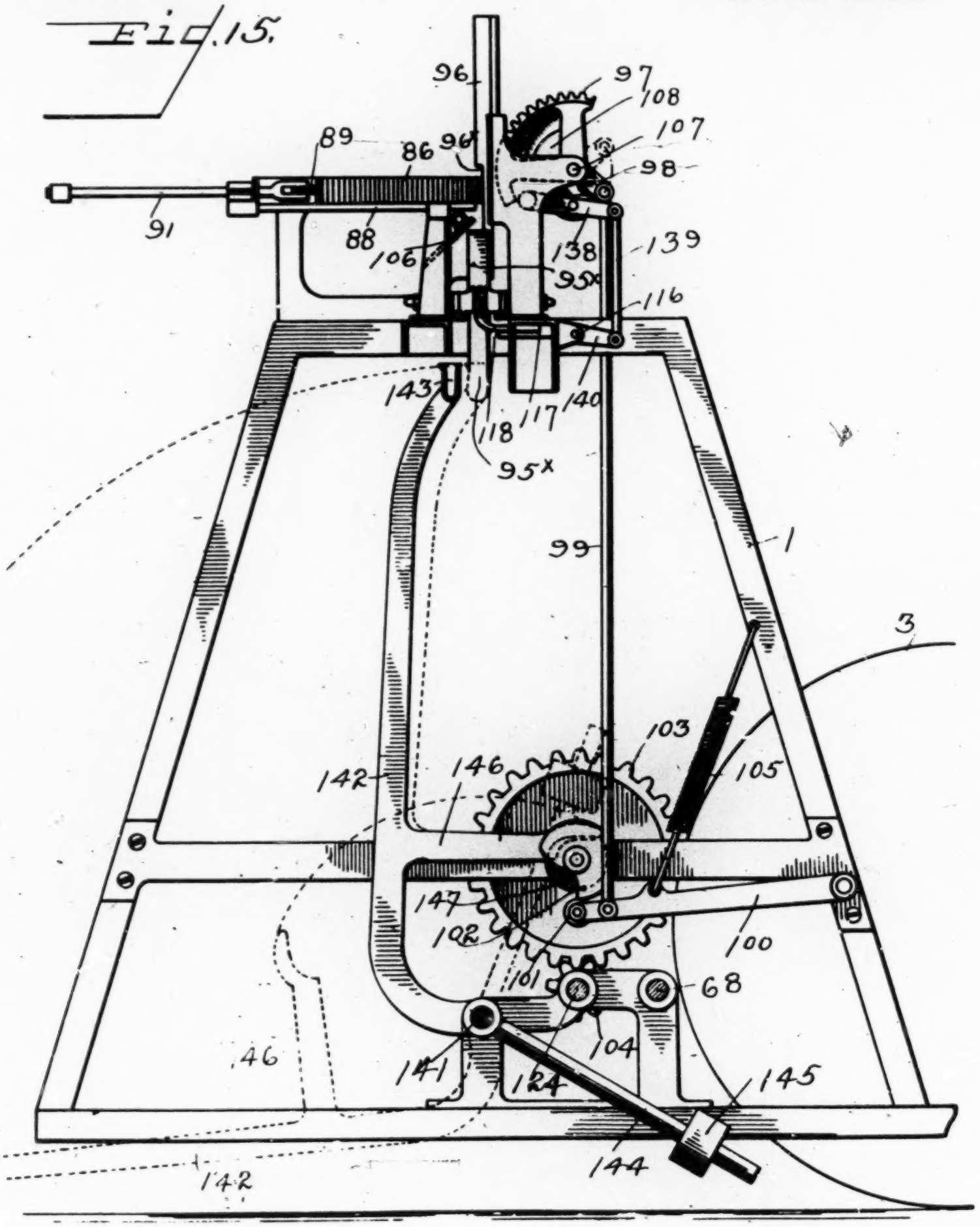
12 SHEETS—SHEET 12.

Fig. 15.



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FREDERICK H. COOK, OF DAYTON, OHIO, ASSIGNOR OF ONE-HALF TO ROBERT N. KING, OF DAYTON, OHIO.

TOBACCO-HARVESTER.

1,134,184. Specification of Letters Patent. Patented Apr. 6, 1915.

Application filed March 17, 1911. Serial No. 615,060.

To all whom it may concern:

Be it known that I, FREDERICK H. COOK, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Tobacco-Harvesters, of which the following is a specification.

My invention relates to harvesters, and particularly to machines for harvesting heavy or luxuriant growths, and is especially adapted for harvesting tobacco, but may be also used for harvesting other similar growths.

In harvesting tobacco it has heretofore been the custom to sever the growing stalks by hand, lay the severed stalks upon the ground to wilt and after the plant has sufficiently wilted, to gather the stalks and secure them upon supports or laths by hand, and thereafter suspend the laths with the plant in inverted position to dry or cure. This method of harvesting is very laborious and involves a great amount of hand labor and requires considerable time. The leaves of the tobacco plant are very tender and easily bruised or torn and any injury to the leaves materially decreases the value of the plant. The harvesting operation therefore requires great care and it is desirable that the plant be handled as little as possible, to avoid injury to the tender leaves.

The object of the present invention is to provide a machine automatic in its action, efficient in use, simple in construction, capable of being operated by an operator unskilled in the usual methods of harvesting tobacco, and unlikely to get out of repair.

A further object of the invention is to provide means for severing the growing stalk and for supporting the stalk during the severing operation and guiding it thereafter in such manner that the tender leaves will be fully protected and any possibility of injury thereto obviated.

A further object is to provide improved conveyer mechanism adapted to independently engage the severed stalks and convey them through a predetermined path of travel, and further to provide means for automatically engaging the severed stalks upon a movable support in predetermined spaced relation and to provide means for discharging the support and attached stalks when a predetermined quantity of stalks have been secured thereon.

With the above primary and other incidental objects in view, as will more fully appear in the specification, the invention consists of the features of construction, the parts and combinations thereof and the mode of operation or their equivalents as hereinafter described and set forth in the claims.

Referring to the drawings, Figure 1 is a plan view of the assembled machine. Fig. 2 is a detail plan view somewhat diagrammatic of the assembled machine, with the superstructure removed showing the various driving connections. Fig. 3 is a side elevation of the assembled machine, the rear portion thereof being broken away. Fig. 3ª is a continuation of Fig. 3 showing the rear portion of the machine, the view being somewhat diagrammatic. Fig. 4 is a front elevation of the assembled machine. Fig. 5 is a detail plan view of the severing mechanism, the follower devices which engage the stalks during the severating operation and the actuating mechanism therefor. Fig. 6 is a detail side elevation of the mechanism shown in Fig. 5. Fig. 7 is a detail plan view of the transfer mechanism and the means for engaging the severed stalks upon the supporting lath, and for distributing the stalks thereon in predetermined spaced relation. Fig. 8 is a diagrammatic plan view showing the driving connection of the various parts shown in Fig. 7. Fig. 9 is an enlarged detail plan view of the mechanism shown in Fig. 7, showing the conveyer mechanism and also the transfer mechanism, for transferring the severed stalks from the conveyer to the supporting lath and the spacing fingers adapted to locate the stalks in proper relation upon the lath. Fig. 10 is a side elevation partly in section of the mechanism shown in Fig. 9. Fig. 11 is a transverse sectional view looking toward the rear or from the right in Fig. 3ª. Fig. 12 is an enlarged plan view of the rear portion of the machine or that portion shown in Fig. 3ª. Fig. 13 is a detail plan view of the feeding mechanism for the movable supports. Fig. 14 is a sectional elevation of the parts shown in Fig. 13. Fig. 15 is a longitudinal sectional view through the rear portion of the machine illustrating the support feeding and discharging devices. Fig. 16 is a detail view of the non-repeating clutch, employed for intermittently driving the conveyer mecha-

nism and also the follower mechanism. Fig. 17 is a detail view of the operating cam for the support discharging devices. Fig. 18 is a detail view of a modification of the supporting member or lath showing a removable sharpened head. Fig. 19 is a detail plan view of one of the elevator grippers engaging a stalk. Fig. 20 is a front elevation of the follower mechanism or stalk supporting devices.

Like parts are indicated by similar characters of reference throughout the several views.

In constructing the machine there is employed a main frame 1 supported on oppositely disposed carrying wheels 2 and 3 and a swivel guiding wheel 4 located at the front of the machine. The carrying wheel 3 constitutes the driving wheel from which the various actuating parts are driven by means of a sprocket chain or belt 5, connecting a sprocket upon the shaft of the carrying or driving wheel 3 with a corresponding sprocket located upon a transverse shaft 6 adjacent to the forward portion of the machine.

The main drive shaft 6 is adapted to be engaged or disengaged from the drive wheel 3 by means of a clutch 7 operated by a hand lever 8 in the usual manner. Thus the operating parts may be disconnected and remain at rest when it is desired to transport the machine from place to place. Carried upon the transverse drive shaft 6 is a beveled gear 9 meshing with a corresponding pinion 10 on the shaft of a crank 11. Carried by the crank 11 is a pitman 12 operating reciprocating severing devices 13 located in a throat 14 formed by the divergent arms 15 which project forward from the main portion of the frame.

The standing stalks entering between the arms 15 as the machine advances are guided to the severing devices 13. Carried by the arms 15 and extending rearward over a portion of the main frame are two guiding shields 16 and 17 of sheet metal or other material presenting a smooth continuous surface over which the leaves of the plant will ride without danger of injury or abrasion. The guiding shields 16 and 17 are curved throughout their length, the outermost shield 16 being inclined toward shield 17, while the guiding shield 17 is inclined away from the shield 16, thereby forming intermediate the shields 16 and 17 a curved or winding throat or passage which will cause the severed stalks conveyed therethrough to be gradually inclined from a perpendicular position. The inner shield 17 extends over the greater portion of the main frame as shown in Fig. 1 protecting the driving mechanism thereof and preventing the leaves of the severed plant from being caught in the moving parts and mutilated thereby. The innermost shield 17 also forms a support for the severed stalks over which they ride until lifted therefrom by the conveying mechanism as hereinafter described. Located adjacent to the innermost forward extending arm 15 and beneath the guide shield 17 is an intermittently operated follower mechanism, comprising a revoluble head 18 having oppositely extending arms 19 which are adapted to protrude through a slot 20 in the said guide shield 17 as the rotary head 18 revolves and engage the standing plant as it approaches the severing devices, to support the plant during the severing operation. Carried by each of the follower arms 19 is a scoop shaped guiding vane 21 secured upon a revoluble sleeve 22 journaled on the follower arm 19. Each of the sleeves 22 carries a gear member 23 adapted to engage a mutilated gear or rack member 24 secured to the supporting bracket 25× in which the rotary follower head 18 is mounted. The normal position of the guiding vane 21 is horizontal; however after the rotary head 18 has been revolved to the point where the follower arms 19 emerge from the slot 20 of the guiding shield 17, the gear member 23 of the sleeve 22 will engage the rack 24 before mentioned, and will cause a partial rotation of the sleeve 22, oscillating the guiding vane 21 from a horizontal position to a substantially vertical position as shown in Figs. 5 and 6. The erection of the guiding shield 21 occurs just prior to the engagement of the stalk by the severing devices, whereby the guiding shield will be in position to support the stalk during the severing operation, and by the advance movement of the follower arms will deflect the stalk, after being severed onto the guiding shield 17.

In the drawings the head 18 has been shown as provided with two follower arms 19, but it is to be understood that additional follower arms may be provided or that a single arm may be employed in which case the speed of rotation of the head 18 will be accordingly modified. The follower mechanism just described is intermittently actuated, being operated only at time when the stalk is about to be severed. The mechanism for driving the follower devices is set in motion by the standing stalk engaging a trip arm 25 normally projecting across the throat 14 and adapted to engage the standing stalk as the machine advances, and to be oscillated thereby. To the trip member 25 is connected a link 26 attached at its opposite end to a lever 27 adapted to operate a cluch member 28.

The clutch 28 may be of any desired construction but is preferably of the nonrepeat type, whereby the clutch will automatically disconnect after having made a predetermined rotation. As shown in the drawings

the nonrepeat clutch 28 comprises a disk 29, having a peripheral flange 30 provided with a notch 31, the disk 29 being mounted on the drive shaft 6. The corresponding clutch member comprises a housing 32 mounted upon the driven shaft 33 rotating within a collar or sleeve 34, the housing and sleeve having in the edge thereof registering notches 35. Pivoted within the housing 32 is the clutch member 36 spring pressed away from the disk 29 and normally resting in the notches 35 of the housing 32 in the collar 34. Upon the engagement of the trip lever 25 with the standing stalk, the lever 27 will be operated to disengage the clutch member 36 from the notches 35 of the housing 32 and collar or sleeve 34 and move said clutch member 36 into engagement with the notch 31 of the disk 29. Upon engagement of the clutch member 36 with the disk 29 carried upon the drive shaft 6, the housing 32 and therewith the driven shaft 33 will be carried in unison with the drive shaft 6, the clutch member 36 engaged in the notch 31 of the disk 29 and riding upon the edge of the collar 34 until it has made one complete rotation, at which times the spring 37 tending to oscillate the clutch member 36 away from the disk 29, will cause said member to return to engagement with the notch 35 upon the clutch 36 reaching such point in its rotation. Thus it will be seen that the driven member 33 will be rotated through one complete revolution at each operation of the clutch 28, and furthermore that operation of said clutch 28 depends upon the engagement of the machine with the standing stalk to be harvested. The driven shaft 33 carries a beveled pinion 38 meshing with a corresponding gear 39 located upon a vertical shaft 40 upon the lower end of which is carried a sprocket wheel 41, over which passes a drive chain 42 engaging a corresponding sprocket 43 upon the shaft of the revoluble follower head 18, this construction is clearly shown in Figs. 5 and 6, and constitutes the intermittently operating mechanism of the follower devices.

By causing the standing stalk to trip the clutch mechanism as before described to operate the follower devices, the operation of said devices will be properly timed in relation to the stalks to be harvested, regardless of their intervals or regularity of the spacing in the rows.

After having been severed by the reciprocating severing devices 13 and deflected laterally upon the guiding shield 17 by the guiding vanes 21 of the follower devices, the stalk is engaged by gripper devices carried upon an elevating chain 44. The elevator chain is located at the right hand side of the machine, and extends adjacent to the throat 14 through which the stalks enter to the severing devices. The elevator chain passes over sprockets 45 and 46 located on the lower forward portion of the machine, from which it extends upward and rearward as shown in Figs. 3 and 3ª, passing over idler sprockets 47 and 48 at the upper rearward portion of the machine, and thence over the drive sprocket 49. The conveying chain 44 carries a plurality of gripper members adapted to independently engage each of the severed stalks and convey them upward and rearward toward the rear of the machine. Located at intervals upon the elevator chain 44 is a series of lugs each formed into a collar or sleeve 50, the axis of which is substantially in alinement with the path of travel of the chain or elevator 44. Revolubly mounted in each of the collars or sleeves 50 is a second sleeve or barrel 51 from which projects an integral or rigid finger 52.

Pivotally supported upon a suitable lug carried by the sleeve or barrel 51 is a bell lever 53 terminating at its extremity in a curved gripper member 54. The bell lever 53 is spring pressed by a spring 55 toward a stationary finger 52 as clearly shown in Fig. 9. The lateral arm of the bell lever 53 is provided with a cam face 56 adapted to engage corresponding cam members 57 located at predetermined points upon the main frame 1. Upon engaging the cam 57 upon the main frame as the gripper member is carried past said cam by the traveling chain, the bell lever 53 is oscillated to separate the gripper fingers 52 and 54 whereby they may either engage or release the severed stalk. Such separation of the gripper fingers 52 and 54 places the spring 55 under tension, whereby said spring will tend to close the gripper fingers, upon disengagement of the cam face 56 with the cam 57. The bell lever 53 and the gripper fingers 52 and 54 being carried by the sleeve or barrel 51, which is journaled in the collar 50 are revoluble in their relation to the chain 44. The guiding sprocket 45 over which the elevator chain 44 passes is located slightly forward of the severing devices 13, whereby the gripper members carried by the elevator chain 44 will engage the stalk at the time the stalk is being severed by the devices 13.

As the severed stalk is deflected by the guiding vane 21 and the winding formation of the throat 14 due to the curvature of the guiding shields 16 and 17, the sleeve or barrel 51 of the gripper member oscillates within the sleeve or collar 50 to compensate for such movement of the severed plant. It is to be understood that one of the cam members 57 is so located on the frame that it will cause the gripper fingers 52 and 54 to be opened to engage the stalk as the stalk is being severed by the devices 13, and as the gripper member advances it will disengage

the cam 57 whereupon the spring 55 will cause the fingers 52 and 54 to securely grip the stalk of the plant. As the gripper member travels upward and rearward with the elevator chain 44 the stalk is lifted from the guiding shield 17, the sleeve or barrel 51 in the meantime rotating to compensate for the different positions of the stalk in relation to the elevator chain, until the stalk is suspended in a substantially vertical position, in which position it is conveyed upward and rearward from the guiding shield 17 to the point where it is disengaged from the conveyer mechanism as hereinafter described. Like the follower mechanism herein before described, the elevator mechanism is intermittently operated and such operation thereof is controlled by the engagement with the machine of the standing stalk to be harvested.

Carried upon the drive shaft 6 adjacent to the gear pinion 59 is a second gear pinion 58 meshing with the corresponding pinion 59, located on the driving portion of the countershaft 60, transversely arranged upon the main frame to the rear of the shaft 6. The drive portion of the countershaft 60 is adapted to be intermittently engaged with the driven portion thereof by a nonrepeat clutch 61 corresponding to the clutch 28 before described. After having engaged and operated the trip lever 25 before mentioned and just before being engaged by the severing devices 13 the standing stalk engages and oscillates a second trip lever 62 connected by a link 63 with a bell lever 64, which in turn is connected by a link 65 with an operating lever 66 adapted to cause the engagement of the nonrepeat clutch 61, by which the elevating mechanism is intermittently actuated. Carried upon the driven portion of the countershaft 60 is a sprocket engaged by a sprocket chain 67 adapted to drive a transverse shaft 68 adjacent to the rear of the main frame. See Fig. 2.

At the extremity of the transverse shaft 68 and beyond the main frame is carried a sprocket wheel over which travels a sprocket chain 69 extending rearwardly and upwardly and driving a sprocket wheel 70 mounted upon a short shaft or trunnion 71 which carries at its opposite end the driving sprocket 49, of the elevator chain 44. The elevating mechanism and driving connections thereof are best illustrated in Figs. 2, 3 and 3ª.

As the severed stalks approach the upper rearward limit of the path of travel of the elevator chain 44, they are disengaged from the gripper devices of the elevating mechanism and transferred through an arcuate path to a suitable supporting member hereinafter described, by revoluble transfer mechanism. The transfer mechanism comprises a revoluble head 72 supported in a pendant position from an inward projecting arm 72ª carried on the main frame, as particularly shown in Fig. 10. The revoluble transfer head 72 is provided with a plurality of radial arms 73 each of which carries a downward projecting lip or lug 74, which forms a stationary gripper jaw. Slidingly mounted in each of the radial arms 73 is a reciprocating member 75, spring pressed inward by a helical spring 76 and carrying on its outer extremity a downward projecting gripper jaw 77, movable to and from the stationary gripper jaw 74, by the reciprocatory movement of the member 75. Secured upon each of the reciprocating members 75 is a bearing block 78 upon which is journaled a roller 79. As the transfer head 72 rotates the rollers 79 of each of the reciprocatory members 75 located on the rotating arms 73, ride upon the irregular periphery of the stationary cam 80 carried upon the inward projecting arm 72ª. The engagement of the rollers 79 with the irregular periphery of the cam 80 causes the respective sliding members 75 to be reciprocated, at predetermined points in the rotation of the head 72, against the tension of the helical spring 76, thereby distending or opening the gripper jaws 77 and 74.

The rotation of the transfer head 72 is so timed that the gripper jaws 77 and 74 will register with the gripper fingers 52 and 54 of the elevator mechanism, and the cam 80 is so located in relation to the rotary transfer head 72 that the gripper jaws 77 and 74 will approach the point of registry with the gripper fingers 52 and 54 in distended or opened position, ready to engage over the upturned end of the severed stalk at which time the rollers 79 will pass off of the shoulder cam 80 and the helical spring 76 will reciprocate the member 75 to cause the gripper jaws 77 and 74 to close upon the extremity of the severed stalk. At the moment of engagement of the severed stalk by the jaws 77 and 74 of the transfer device the cam face 56 of the bell lever 53 will engage the cam member 57 oscillating said lever which will cause the gripper fingers 52 and 54 of the elevating mechanism to disengage the stalk leaving it suspended from the gripper jaws 77 and 74. The elevator chain 44 is driven at a greater linear speed than the rotary transfer head 72, therefore the gripper fingers 52 and 54 upon their disengagement from the severed stalk will be carried away from the stalk and out of the path thereof. Thus the severed stalk is left suspended from the radial arms of the rotary transfer head 72, by which it is carried through an arcuate path to the support or lath waiting to receive it as hereinafter described. The rotary transfer head is driven from the sprocket 81, carried on the transverse rotary stud or trunnion 71 common to the sprockets

70 and the elevator driving sprocket 49, by a sprocket chain 82 engaging a sprocket upon a transverse countershaft 83 mounted in suitable bearing on the main frame. The countershaft 83 carries at its inner extremity a beveled pinion 84 meshing with a similar pinion 85 upon the upper end of the vertical shaft of the rotary transfer head 72. The driving connections of the rotary transfer head 72 are best shown in Figs. 7 and 10, while the detail construction of the rotary transfer head is best shown in Figs. 9 and 10.

Located upon the upper rear portion of the main frame is a magazine or container for a supply 86 of supporting members or laths sharpened at one end, or provided with a removable sharpened head as shown in Fig. 18, and adapted to be projected singly into the path of the severed stalk carried by the rotary transfer head 72 whereby the severed stalk will be impaled upon the sharpened point of said lath or support. The supporting members or laths may be either of wood or of metal pointed at the receiving end to more readily pierce the stalk or they may be provided with interchangeable pointed spear heads 87 as shown in Fig. 18.

The location of the magazine for the laths or supports is best shown in Fig. 1 while an enlarged detail plan view thereof is shown in Fig. 12. The feeding mechanism for the laths or supports is shown in detail in Figs. 13 and 14.

The series of independent pointed laths forming the supply 86 are arranged in transverse position and rest upon longitudinal bars 88. As each successive lath is fed from the magazine or receiver by the means herein after described, the remaining laths or supports are advanced toward the discharged point of the receiver by a follower head 89 which may be spring actuated but is preferably actuated by means of a cable 90 attached to the rearward projecting arm 91 carried by said follower head, the cable 90 passing over pulleys 92 and carrying at its extremity a weight not shown in the drawings.

The side members 93 of the support magazine are provided with inward projecting lugs 94 and 95 which limit the forward movement of the supports within the magazine or container. The lug 95 located at the left side of the machine is hooded to prevent vertical displacement of the vertical supports or laths while in engagement therewith and immedintely below said lug is provided an abutment 95* for the supports or laths during the impaling process by which the severed stalks are secured thereon. The longitudinal bottom bars 88 upon which the supports or laths are carried within the magazine terminate in a plane adjacent to the inward projecting lugs 94 and 95 leaving sufficient space through which the lath or support in engagement with the lugs 94 and 95 may be projected downward from the magazine and past the ends of the supporting bars 88. Located adjacent to the forward portion of the magazine, in position to engage the foremost support or lath therein and eject it from said magazine through a downward path into position to receive the advancing stalks are two vertically moving plungers 96 offset or shouldered as at 96* to engage the lath or support. These vertical plungers 96 are mounted in suitable ways on the main frame and are operated by means of a gear sector 97 engaging corresponding gear rack formed on the plungers 96. The gear sector 97 is provided with a rock arm 98 engaged by a downward projecting link 99 connected at its opposite end to a lever 100 pivoted to the main frame of the machine as shown in Fig. 15. The lever 100 carries at its extremity a roller 101 engaging a cam 102 adapted by its rotation to oscillate the lever 100. The cam member 102 is rotated by means of a gear 103 mounted on the shaft common with said cam and driven by a pinion 104 carried on the extremity of the transverse drive shaft 124 located in the rear lower portion of the machine. A retracting spring 105 is provided for the lever 100 which is adapted to maintain said lever 100 in engagement with the irregular periphery of the cam 102. As the lever 100 is oscillated by means of the retracting spring 105 upon the rotation of the cam 102, the lever operates through the link 99 to oscillate the gear sector 97, thereby causing a downward movement of the ejector plungers 96 the shoulders of which engage the foremost support or lath within the magazine and carry it downward therefrom. Pivotally supported beneath the support magazine are swinging guard plates 106 movable to and from the reciprocating plungers 96 and adapted to be moved into parallel relation therewith upon the downward movement of said plungers to form a guide or chute to direct the movement of the support or lath during its passage from the magazine. The swinging plate 106 will form one side of such chute or guide way, while the vertical plunger 96 will form the opposite side thereof.

Referring particularly to Figs. 13 and 14 there is mounted on the shaft 107 upon which is carried the gear sectors 97, a cam member 108 having two irregular cam grooves therein 109 and 110. This cam member 108 being carried upon the shaft 107 oscillates in unison with the gear sectors 97. Journaled in the main frame is a rock shaft 111 carrying at one end thereof a rock arm 112 engaging the cam groove 109 of the cam member 108. At its outer extremity the rock shaft 111 carries a rock arm 113 pivotally connected to a second rock arm 114 secured

upon a rock shaft 115, upon which is rigidly carried the swinging guide members 106. Thus upon the oscillation of the shaft 107 by means of the lever 100 and the link 99 as before described, the cam member 108 carried therewith will cause an oscillatory movement of the rock arm 112 which engages in the cam groove 109 thereby rocking the shaft 111 and the arm 113 which through its engagement with the rock arm 114 will cause a corresponding oscillation of the shaft 115 carrying with it the guide members 106 which will be thereby moved to a parallel position in relation to the plungers 96 as shown in dotted lines in Fig. 14. Such oscillation of the shaft 107 and gear member 97 will also cause a reciprocation of the ejector plungers 96, which moving downward will carry the foremost support or lath within the magazine with them through the throat or passage way formed intermediate the guiding members 106 and said vertically moving plungers 96. The lath thus ejected from the magazine will be carried into the path of the advancing severed stalks and will be held stationary therein while a plurality of the stalks are engaged upon said lath or support as herein after described.

In order to support the lath in position to receive the stalks there is provided a transverse rock shaft 116 located below the shaft 107 having rock arms or plates 117 carried thereon, to each of which rock arms or plates 117 there is pivoted an oscillating finger 118 upon which the lath or support may rest. These fingers 118 normally project into the path of the lath or support as it is carried from the magazine, and into that of the advancing stalks, but are adapted to be oscillated out of such path through a horizontal plane of oscillation against the tension of their retracting springs 119 to permit the passage of the severed stalks which have been impaled upon the lath or support. There are a plurality of the rock arms or plates 117 carried upon the shaft 116 and all such plates 117 operate in unison upon the oscillation of the shaft 116. However the supporting finger 118 carried upon each of the rock arms or plates 117 may be oscillated independent of each other against the tension of their individual springs 119. The lath or support resting upon the movable fingers 118 is now in position to receive the severed stalks which are impaled thereon and are afterward distributed at regular intervals throughout the length of the support or lath. The severed stalks being carried from the elevator mechanism by the gripper jaws 77 and 74 of the radial arms 73 carried by the rotary transfer head 72 are pressed upon the sharpened point of the support or lath by the action of said rotary arms 73 causing the sharpened point of the lath to pierce the stalk which is firmly held by the gripper jaws 77 and 74 until after it has been pierced by the support. The piercing or impaling operation is assisted by means of lugs or fingers 120 carried by traveling chains or belts 121 arranged parallel with and on opposite sides of the stationary support or lath, as shown in Figs. 7 and 9. The pusher or spacing fingers 120 passing around the drive pulleys 122 and 123 engage the rear side of the stalk and by their advance movement force the stalk upon the sharpened point of the support thus assisting the gripper jaws 77 and 74 of the transfer mechanism which maintain their engagement with the stalk until after the stalk is impaled upon the support. After the stalk has been secured upon the support the rollers 79 of the reciprocatory member 75 of the transfer mechanism rides over the inclined surface of the cam 80 which reciprocates the member 75 to cause the disengagement of the jaws 74 and 77 from the severed stalk, which is left impaled upon the support while the transfer head 72 rotates the succeeding radial arms 73, bringing other stalks from the elevator mechanism to the support or lath. After the stalks have been impaled upon the lath or support and the gripper jaws 74 and 77 of the transfer devices are disengaged therefrom the stalk is slidingly adjusted on the support by the advancing pusher or spacing fingers 120, which project inward from either side, engage behind the stalk and as the chains 121 travel about their driving sprockets the stalk is advanced upon the support. When a predetermined number of stalks have been secured upon the lath or support the lath is discharged from the machine and another lath is fed downward from the magazine into the path of travel of the stalks as before mentioned.

In order to drive the pusher or spacing fingers 120 at proper intervals there is provided in the main portion of the machine immediately back of the transverse shaft 68 a second transverse shaft 124. This shaft 124 is driven by means of gear pinions from the shaft 68. In the drawings a variable speed mechanism comprising a series of shifting or sliding gears 125 is shown, the various gears of which may be engaged by the sliding or shifting movement with one of the gears 126 mounted upon the transverse shaft 124, thereby providing means whereby the shaft 124 and the pusher fingers 120 and the support discharge devices to be hereinafter described, may be operated at different rates of speed. At the right extremity of the transverse shaft 124 is carried a beveled pinion 127 meshing with a corresponding pinion 128 mounted upon a vertical shaft 129 journaled in the main frame. At its upper extremity the shaft

129 carries a gear pinion 130 meshing with a similar pinion 131 mounted upon the lower extremity of the trunnion or shaft of the driving pinion 122 of one of the belts or chains 121 carrying the pusher or spacing fingers 120. This construction is best shown in Fig. 3ª. At its lower extremity the vertical shaft 129 carries a gear 132 meshing with an idler gear 133 mounted upon the main frame which in turn drives a third gear 134 carried upon the lower extremity of a second vertical shaft 135. The vertical shaft 135 carries a gear pinion 136 corresponding to the gear pinion 130 of the shaft 129. The gear pinion 136 meshes with a pinion 137 carried upon the lower extremity of the vertical trunnion or shaft of the drive sprocket 123 carrying the other of the endless chains or belts 121 upon which is supported the second series of pusher or spacing fingers 120. The transverse shaft 68 being intermittently operated from the countershaft 60 by means of the non-repeat clutch 61, it will be obvious that the shaft 124 and the vertical shafts 129 and 135 will also be intermittently operated, thereby driving the pusher fingers 120 through a step by step movement. The lath or support feeding mechanism hereinbefore described and the lath or support discharging mechanism to be hereafter described, being both operated from the transverse shaft 124 by means of the gear pinion 104 mounted upon the left hand extremity thereof, will be operated in proper time with the pusher fingers 120. It will also be obvious that the speed of the said devices, that is the pusher fingers, the support feeding devices, and the support discharging devices, may be varied in relation to the remainder of the operating parts by adjustment of the sliding or variable driving mechanism 125. As the severed stalks are slidingly adjusted to their predetermined position along the support or lath the stalks successively engage the pivoted supporting fingers 118, the said fingers yielding against their springs 119 to permit the passage of the stalk along the lath. There being a plurality of the yielding fingers 118 engaging and supporting the lath, which fingers are operated independently of each other, there will always be sufficient number of such fingers engaging and supporting the lath while other fingers are yielding to permit the passage of the stalks thereon. When a predetermined number of severed stalks have been impaled upon the lath or support and have been shifted thereon by means of the pusher fingers 120 to the predetermined spaced relation, the supporting fingers 118 are simultaneously withdrawn from engagement with the lath or support to permit the discharge thereof and another support or lath is simultaneously ejected from the magazine or receiver into position to receive the oncoming stalks. Pivotally supported on the main frame of the machine adjacent to the cam member 108 is a lever 138 having a stud or roller engaging in the cam groove 110 of the said member 108. Connected to the extremity of the lever 138 is a link 139 engaging at its opposite extremity a rock arm 140 carried on the rock shaft 116 upon which are supported the rock arms 117 and the yielding fingers 118. The initial movement of the cam 108 upon the oscillation of the shaft 107 necessary to cause the gear sectors 97 to operate the plungers 96 to eject the next support or lath from the magazine, causes an oscillatory movement of the lever 138 which is transmitted through the link 139 and the rock arm 140 to the rock shaft 116, thereby oscillating the rock arms or plates 117 upon which are pivoted the yielding fingers 118, to withdraw the said fingers 118 from beneath the lath or support which being weighted by the severed stalk will move downward by gravity out of the path of the next succeeding lath which is being carried down by the ejector plungers 96.

If the support or lath with the severed stalks impaled thereon should not move readily upon the withdrawal of the supporting fingers 118 the next succeeding lath being pressed downward by the ejectors 96 will engage the upturned ends of the stalks and will push the support and stalks carried thereon downward and out of its path. The oscillation of the shaft 107 to cause the feeding of the next succeeding support or lath and the withdrawal of the support or lath upon which the severed stalks have been impaled is caused by the oscillation of the lever 100 and the link 99 before described as shown in Fig. 15. The relative proportion of the gear pinion 104 and the gear 103 by which the cam 102 is rotated, thereby controlling the movement of the lever 100, is such that the support ejecting mechanism will only be operated after a predetermined number of stalks have been engaged upon the supports. Journaled in suitable bearings on the main frame and to the rear of the transverse shaft 124 is a rock shaft 141 forming a part of an oscillating frame including the swinging arms 142 located at each side of the machine having notches or recesses 143 in its upper extremities adapted to receive the loaded support or lath and convey the lath or support and the severed stalks attached thereon through an arcuate path and deposit them upon the ground to the rear of the machine. The said swinging discharge frame comprising the arms 142 is counterbalanced by a weighter arm 144 carried upon the transverse shaft 141, the weight 145 of which is adjustable thereon. One of the swinging arms 142 is provided with an inward pro-

jecting arm 146 engaging a cam 147 located on the shaft of the cam 102 and gear 103 which by its engagement with the arm or finger 146 is adapted to oscillate the frame member 142 through a limited path of travel. As the cam 147 rotates and simultaneously with the operation of the support ejector mechanism controlled by the cam 102, the cam 147 permits the swinging frame members 142 to advance under the influence of the weighted arm 144 until the notches or recesses 143 will extend into the path of the loaded support or lath as it drops downward from between the pusher fingers 120 upon the withdrawal of the supporting fingers 118. As the loaded support moves downward the opposite extremities thereof engage the recess or notches 143 of the arm 142 whereby the supports and the stalks attached thereto will be carried solely by the swinging frame members 142 independent of the other portions of the machine. At this time the cam member 147 by its engagement with the arm 146 tends to oscillate the swinging frame members 142 slightly rearward, whereupon the weight of the support and the severed stalks thereon carried by the swinging frame members 142 will overbalance the weighted arm 144 and the frame with the support and attached stalks will swing rearward and downward to the ground, and as the machine moves forward the notched portions 143 of the swinging frame members 142 will be withdrawn from the support and the weighted arm 144 will return the swinging frame members 142 again to upright position. The swinging frame members 142 are normally maintained slightly to the rear and out of the path of travel of the stalks and are allowed to advance to receive the loaded support only after a predetermined quantity of stalks have been attached thereto. Thus the swinging frame members are maintained out of the path of travel of the stalks until it becomes necessary to discharge the loaded support from the machine.

Operation of the machine: By the intermittent operation of the machine as before described, the time of operation of the several parts being controlled by the standing stalks to be harvested the various operations are performed in proper time and sequence regardless of the relative location of the plants in their rows. Thus it is immaterial whether the plants be regularly or irregularly spaced in the row, or whether the interval between the plants if regularly spaced is great or small. The construction is such that the various parts of the machine will only operate when a stalk is to be harvested regardless of the frequency with which the stalks are encountered. The machine being drawn across the field by a tractor, horses or other propelling means encounters the standing stalks one at a time, each stalk oscillating the lever 25 to connect the clutch 28 whereby the follower mechanism is caused to operate. As the machine advances the standing stalk before being severed engages and operates the second lever 62, the movement of which sets in operation the elevator mechanism, the transfer mechanism, the spacing devices and after a certain number of stalks have been severed, the support feeding and discharging mechanism are operated through the same control. After having operated the lever 62 the standing stalk is engaged and severed by the reciprocatory severing devices 13, the guiding vane 21 having in the meantime been elevated in the rear of the stalk to support the stalk, and after the severing operation the rotating follower arm and guiding vane 21 carry the stalk laterally onto the shield 17. At this time the severed stalk is engaged by the butt or woody portion thereof by the elevator fingers 52 and 54 carried upon the elevating chain 44 and is lifted from the supporting shield 17 into an inverted position, in which position it is carried rearward to the transfer mechanism. The gripper jaws 74 and 77 carried upon the radial arm 73 of the transfer head 72 now engage the severed stalk and upon the release thereof from the elevator fingers 52 and 54, the transfer head carries the stalk through an arcuate path and impales it upon the movable support or lath which has previously been fed to a position in the path of the oncoming stalk. The pusher fingers 120 carried on the traveling chains 121 now engage the stalk, and after assisting in the impaling process slide it longitudinally upon the lath or support as the said chains 121 are operated through a step by step movement, the steps of which are determined by the engagement of succeeding standing stalks with the control lever 62. The path of travel of the severed stalks is indicated by dot and dash lines in Fig. 2, the positions of the severed stalks being shown on said lines by the black disk. After a predetermined number of stalks have been impaled upon the lath or support the lath or support is released and another lath is fed from the magazine. The loaded lath or support is discharged from the machine by the swinging frame members 142. The plant being rather bushy and having comparatively broad leaves will afford some resistance to the air as the swinging frame 142 moves downward, thereby cushioning the fall of the plant upon the ground, and obviating danger of injuring the plant by violent contact with the ground upon its discharge from the machine.

From the above description it will be apparent that there is thus provided a machine of the character described possessing the

particular features of advantage before enumerated as desirable, but which obviously is susceptible of modification in its form, proportion, detail construction and arrangement of parts, without departing from the principle involved or sacrificing any of its advantages.

Having thus described my invention I claim:

1. In a tobacco hanger, a main frame having severing devices thereon, a conveyer extending upward in an inclined direction from the severing devices and adapted to independently engage the butt of each stalk allowing the leaves thereof to extend in a pendant position from each conveyer, a supporting member to which the stalks are conveyed in a pendant position by said conveyer, means for independently securing the stalks in spaced relation upon the support, substantially as specified.

2. In a tobacco hanger, a main frame having severing devices thereon, a conveyer inclined upward from the severing devices, engaging devices upon the conveyer for independently engaging the butt of each stalk permitting the leaves thereof to extend free of the conveyer, means to reverse the position of the severed stalk whereby the stalk will be conveyed in a pendant position with its leaves free and downward, a support to which the stalks are carried by the conveyer, means for independently attaching the stalks to said support in an inverted pendant position, and means for automatically discharging the support from the machine when a predetermined quantity of stalks have been collected thereon.

3. In a harvesting machine, a traveling main frame, severing devices carried thereby, intermittently operated conveying mechanism for the severed stalks, a support to which the stalks are conveyed by the conveyer, means for securing the stalks upon the support, and trip mechanism operated by engagement with the standing stalk to be harvested whereby the conveyer will be operated only when a stalk is to be delivered to the support, thereby avoiding any vacant positions upon the support, substantially as specified.

4. In a tobacco hanger, a main frame, a support carried thereon, means for securely gripping each stalk to be attached and for forcibly projecting the stalk upon the sharpened end of the support whereby it will be impaled thereon, and means for advancing the impaled stalks upon the support through a step by step movement to predetermined spaced relation.

5. In a harvesting machine, a main frame, severing devices, impaling devices intermittently operated, conveying mechanism adapted to carry the severed stalks from the severing devices to the impaling devices, and means operated by engagement with the standing stalks to be harvested for causing the operation of the conveying means, whereby said conveying devices will be operated only when a succeeding stalk is to be impaled, thereby avoiding vacancies in the succession of impaled stalks.

6. In a tobacco hanger, a main frame, a sharpened support upon which the severed stalks are to be impaled carried upon said frame, means to engage the butts of the severed stalks at a point removed from the sharpened end of the support and present the severed stalks to the sharpened extremity of the support in an inverted pendant position with the butt of the stalk alined with the support, means for slidingly adjusting the impaled stalks upon the support, substantially as specified.

7. In a tobacco hanger, a main frame, an oscillating head carrying a swinging arm oscillating in a horizontal plane, gripper jaws carried by said swinging arm adapted to engage the butt of the stalk whereby the stalk will be suspended from the arm in inverted position, a sharpened support projecting into the path of the swinging arm upon the sharpened end of which the stalk is forcibly projected by the movement of the swinging arm and means to cause the release of the gripper jaws after the stalk has been impaled upon the support, substantially as specified.

8. In a harvesting machine, a traveling main frame, severing devices thereon, a support upon which the stalk is to be impaled, a movable arm, a gripper member carried by the arm and adapted to engage the butt of the stalk thereby centering the stalk butt in relation to the support, and by a movement of the arm to forcibly project the stalk upon the support while still engaged by the gripper member, and means to cause the release of the gripper member after the stalk has been impaled, substantially as specified.

9. In a harvesting machine, a main frame having severing devices thereon, conveyer means for the severed stalks comprising a traveling arm, gripper members carried by the said arm, cam faces engaged at different points in the path of travel of said arm whereby the gripper member will be operated to engage and disengage the stalks, and a support upon which the engaged stalk is projected by the swinging arm.

10. In a harvesting machine, a main frame having severing devices thereon, conveyer means for the severed stalks comprising a traveling arm, a gripper jaw carried on said arm, a reciprocatory member supported on the arm, a second gripper jaw carried by the reciprocatory member, cam faces engaged at predetermined points in the path of travel of the arm adapted to cause a reciprocatory movement of the said

reciprocatory member causing the gripper jaws to vary in their relation to each other whereby the jaws will be caused to engage and disengage the severed stalks and a support upon which the engaged stalks are forcibly projected by the movement of said arm.

11. In a harvesting machine, a main frame having severing devices thereon, conveying means for the severed stalks comprising a revoluble shaft, an arm carried by said shaft, a gripper jaw supported on the arm, a second gripper jaw also carried by the arm and movable in relation to the first mentioned jaw, a cam member, means connected with the movable jaw engaging the cam member and thereby shifting the said jaw at predetermined points in the path of travel whereby the jaws will be caused to engage and disengage the severed stalks and a support upon which the engaged stalks are forcibly projected by the movement of said arm.

12. In a harvesting machine, a main frame having severing devices thereon, conveying mechanism, a support upon which the severed stalks are impaled, a traveling member adapted to engage the impaled stalks and shift them longitudinally upon the support through successive steps of a step by step movement after being impaled thereon.

13. In a harvesting machine, a traveling main frame having severing devices thereon, carrying wheels, severing devices, means for reversing the position of the severed stalk, means for securing the severed stalks in inverted position upon movable supports, and means for discharging the supports and attached stalks.

14. In a harvesting machine, a main frame, having severing devices thereon, carrying wheels, conveyer means for the severed stalks comprising an endless traveling belt, gripper members carried by the endless belt, means for automatically operating the gripper members to engage and disengage the stalks at predetermined points in their path of travel, and a swinging member having stalk engaging means thereon adapted to engage the severed stalks when released by said gripper members and convey the severed stalks through an arcuate path, and means to cause the stalk engaging means to release the stalk at a predetermined point in its path of travel.

15. In a harvesting machine, a main frame having severing devices thereon, carrying wheels, an intermittently operated follower member adapted to support and guide the severed stalk and means operated by the standing stalk to be harvested for causing the operation of the follower member.

16. In a harvesting machine, a main frame having severing devices thereon, carrying wheels, an intermittently operated follower member adapted to engage the side of the stalk opposite the severing devices, actuating mechanism therefor including a main drive shaft, a driven shaft, a clutch member, a yielding member projecting into the path of the standing stalk adapted by its operation to cause the engagement of the clutch to actuate the follower member.

17. In a harvesting machine, a main frame having severing devices thereon, carrying wheels, a follower member moving in a horizontal plane adapted to engage the side of the stalk opposite the severing devices and means for tilting the follower member in a vertical plane to deflect the stalk in the desired direction.

18. In a harvesting machine, a main frame having severing devices thereon, carrying wheels, a follower arm adapted to engage the side of the standing stalk opposite the severing devices, a guiding vane carried by the follower arm, and means to oscillate the vane in relation to the swinging arm to guide the stalk after being severed.

19. A harvesting machine, a main frame having severing devices thereon, carrying wheels, a follower arm adapted to engage the side of the standing stalk opposite the severing devices, a sleeve journaled on said arm, a guiding vane carried by the sleeve, a gear member also carried by the sleeve, and a stationary rack member engaged by the gear member in its path of travel whereby the sleeve will be rotated upon the follower arm to oscillate the guiding vane thereabout.

20. In a harvesting machine, a main frame having severing devices, carrying wheels, a swinging arm adapted to engage the side of the standing stalk opposite the severing devices, a guiding vane pivotally carried by the swinging arm, and means to oscillate the guiding vane about said swinging arm to support the stalks after being severed.

21. In a harvesting machine, a main frame having severing devices thereon, carrying wheels, a revolving head, follower arms carried by the head, guiding vanes carried by the follower arms, and means to oscillate the guiding vanes about their connection with the follower arms in planes angular with the plane of movement of said follower arms at predetermined points in the rotation of the revolving head.

22. In a harvesting machine, a main frame having severing devices thereon, carrying wheels, a revolving head, follower members carried by said head and adapted to engage the stalk prior to the severing thereof and to support the stalk during the severing operation, and means to intermittently operate said follower members including a non-repeat clutch adapted to automatically disconnect the driving mechanism

of the follower members after the severing operation has been completed, and a clutch operating device adapted to engage the stalk to be harvested whereby said clutch will be connected.

23. In a harvesting machine, a main frame having severing devices thereon, carrying wheels, intermittently operated conveying mechanism adapted to receive the severed stalks, actuating mechanism therefor including a drive clutch member, a clutch operating member projecting into the path of the standing stalk to be harvested and when operated by engagement therewith adapted to connect the drive clutch whereby the conveyer mechanism will be operated through a predetermined degree of movement.

In testimony whereof, I have hereunto set my hand this 11th day of March, A. D. 1911.

FREDERICK H. COOK.

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COTTON HARVESTER.

APPLICATION FILED FEB. 18, 1918.

1,275,781.

Patented Aug. 13, 1918.

3 SHEETS—SHEET 1.

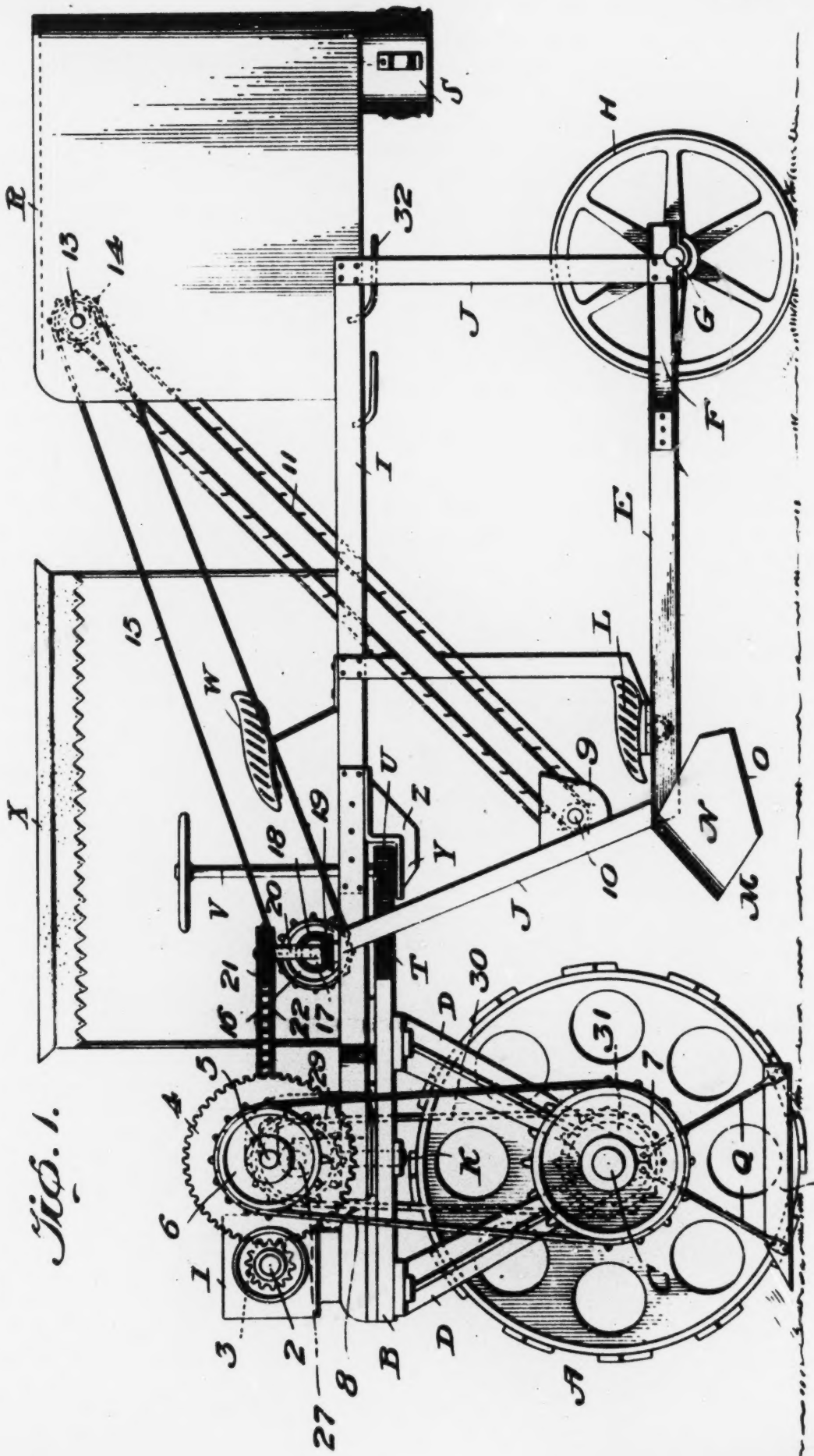

Fig. 1.

Witnesses

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3 SHEETS—SHEET 2.

Fig. 3.

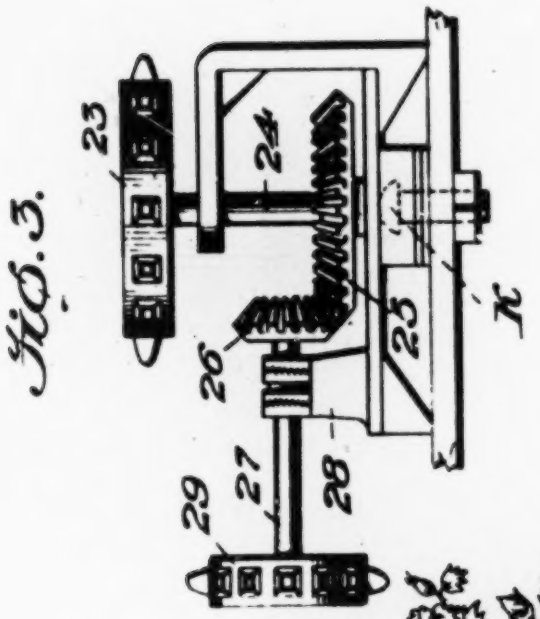
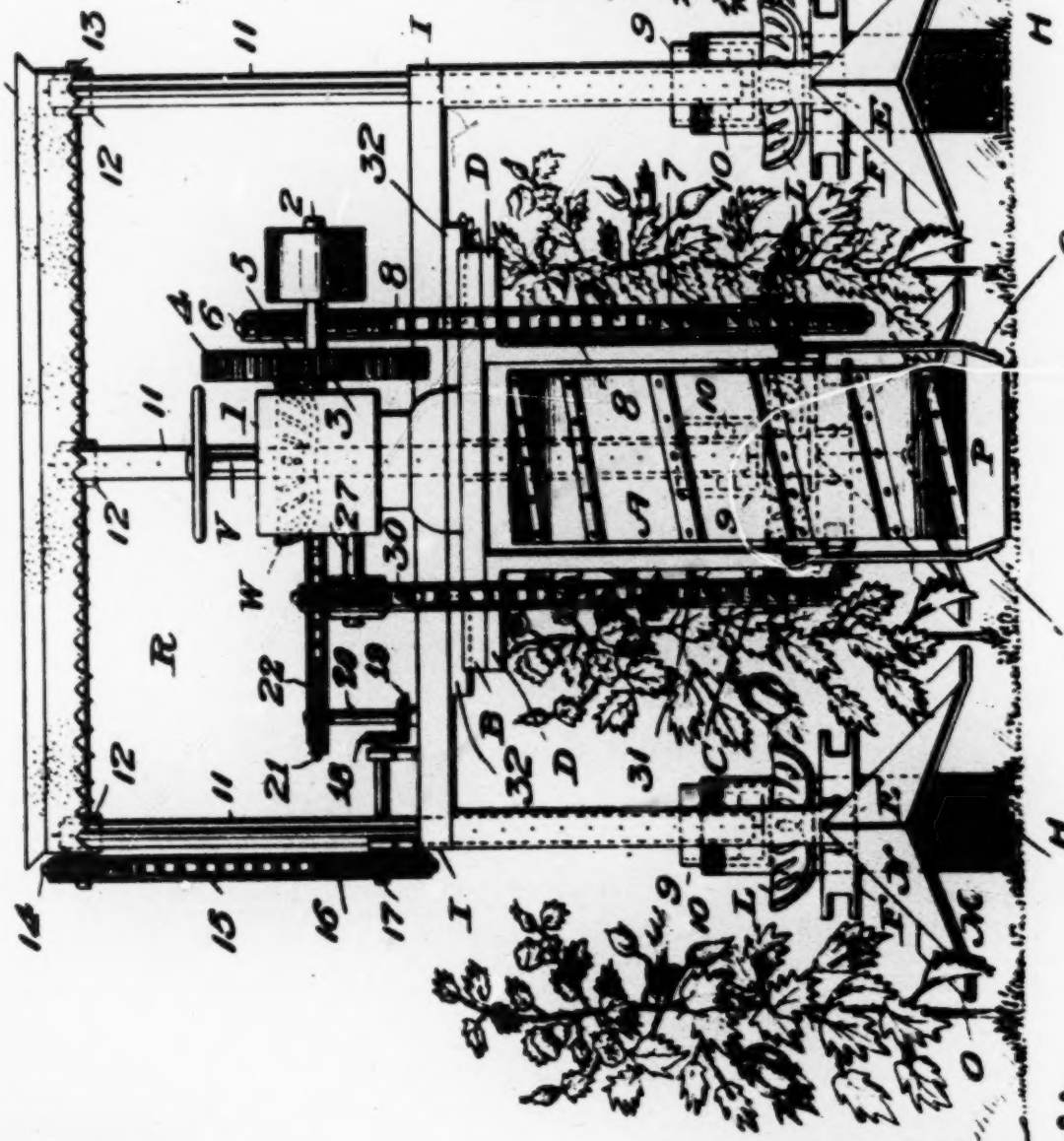


Fig. 2.



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3 SHEETS—SHEET 3.

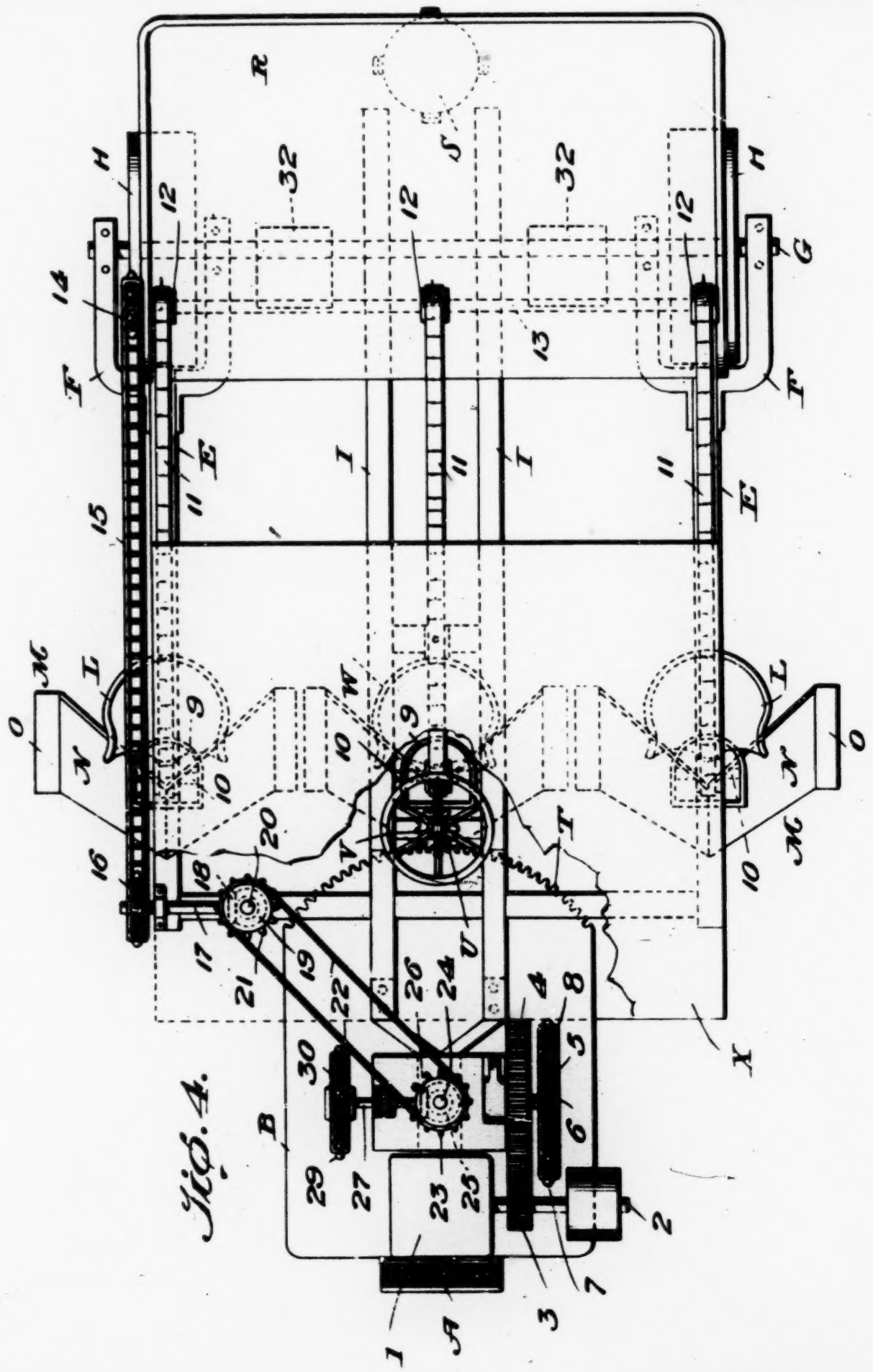

Fig. 4.

Witnesses

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ALVIN E. STARK AND MYERS A. GARRETT, OF BRAZORIA, TEXAS; SAID MYERS A. GARRETT ASSIGNOR TO CARLTON M. GARRETT, OF DETROIT, MICHIGAN.

COTTON-HARVESTER.

1,275,781. Specification of Letters Patent. Patented Aug. 13, 1918.

Application filed February 15, 1918. Serial No. 217,899.

To all whom it may concern:

Be it known that we, ALVIN E. STARK and MYERS A. GARRETT, citizens of the United States, residing at Brazoria, in the county of Brazoria and State of Texas, have invented certain new and useful Improvements in Cotton-Harvesters, of which the following is a specification.

The picking of cotton is attended with such conditions that an efficient machine for the purpose has so far not been devised.

In the upland fields the bush grows from two to four feet high, the most common height being under three feet. The branches spread and the cotton bolls are distributed about the outer ends of the limbs. The plants are set in rows from two to seven feet apart, according to the quality of the soil, and usually are thinned out in the rows so that the plants are from two to four feet apart.

The bolls on the lower branches usually mature first and burst at maturity, exposing the snowy fiber. In gathering the lint it is needful to keep it free from leaves, stems, or fragments of the shell of the pods, all of which goes by the name of "trash," and when present impairs the value of the fiber.

The serious obstacles to mechanical picking arise from the irregular height and spacing of the plants, the inequality in the maturing of the bolls, the necessity of avoiding injury to the plants in the earlier gatherings, and the difficulty of withdrawing the ripe lint without admixture with husks, stems, and broken leaves. The problem is so complicated that a successful machine for picking has not yet been devised and seems impossible.

The object of our invention is to provide in connection with hand picking certain mechanism and devices whereby in such picking the usual disagreeable, exhausting and expensive labor may for the most part be eliminated, such as the bending of the body forwardly, stooping, dragging of a heavy bag about the furrow in the hot sun, and fumbling for the mouth of the bag with the hand.

To this end we provide a wheeled machine, preferably power operated, said machine having swiveled seats for the pickers, hopper elevators or conveyers or other devices located adjacent the seats in which the cotton picked by hand is to be deposited and delivered to a bin or other receptacle on the machine, means for elevating the lower branches of the plants to within easy reach of the pickers, and a protecting sun-shade, thereby in particular securing free movements of the hands and body and generally increasing the efficiency of the labor.

The machine constantly moving forwardly compels the picker to give undivided attention to the work and so prevents loafing or shirking. The speed of the machine is accommodated to the condition of the crop, moving faster or slower as may be necessary to gather the matured cotton. The hands of the picker being free at all times, he can avoid including in the picking leaves, twigs or other foreign matter, the product gathered consequently being a superior grade of cotton.

Our invention consists in certain novelties of construction and combinations and arrangements of parts as herein set forth and claimed. The accompanying drawings illustrate an example of the embodiment of our invention, the parts being combined and reciprocally arranged according to the best mode of procedure we have so far devised for the purpose.

Figure 1 is a side view in elevation of the entire machine or cotton harvester.

Fig. 2 is a front end view in elevation.

Fig. 3 shows in elevation part of the gearing which is located on the platform back of the motor.

Fig. 4 is a top plan view.

The main parts of the machine comprise a traction wheel A having a platform B supported upon the axle C through the medium of V-shaped supports, D D, carrying bearings mounted upon the journals, as shown; and a frame which may be of light channel beams riveted together, or of wood, embracing the lower parallel beams E, the two outer ones of which are provided with U-shaped extensions F which have bearings for the axles G of the supporting wheels H, the upper parallel beams I supported upon the upright beams J which are secured to the lower beams, the two central beams I being extended and united and pivoted to the platform B by means of any type of fifth wheel and a king bolt K.

Three swiveled seats L for the pickers are arranged in line and supported upon the lower parallel beams E, as shown. Below

and in front of the seats and attached to the beams are deflecting pilots M, each having two inclined sides N and wings O which as the machine moves forwardly pass beneath the lower branches of cotton plants and raise them up to within easy reach of the hands of the pickers. The traction wheel A is also provided with a similar deflecting pilot P supported by depending bars or rods Q in front of and surrounding the tread of the wheel, its function being for raising and deflecting the lower branches of the plants from the path of the wheel so that they will not be crushed or injured by the forward movement of the same.

Upon the rear ends of the upper beams I is supported a closed bin or receptacle R within which the picked cotton is deposited, a chute S being provided for the discharge of the cotton from the bin or receptacle to bags.

The rear end of the platform B has a rack T of the shape of an arc of a circle which engages a toothed wheel U on a steering shaft V having a hand wheel located and suitably supported in front of a seat W occupied by the operator of the machine. It is obvious that the platform and traction wheel A can be turned toward the right or left by the rotation of the steering shaft and wheel U.

A sun-shade or canopy X suitably supported is provided above the four seats carried by the frame, which shade may be of any suitable dimensions.

It will be observed that the machine is supported upon two rear wheels H spaced apart and a single front traction wheel A, and that the latter wheel and the platform with the devices mounted upon it move together about the king bolt K as a center, the platform being held in place relative to the frame by the king bolt and the forwardly projecting arm Y of the bracket Z, which arm extends beneath the rack edge of the platform, thus preventing any wabbling or tipping of the platform relative to the ends of the frame to which it is pivoted.

The machine may be pushed or pulled or moved forwardly by any suitable power, animal or otherwise. We have shown a hydrocarbon or gas engine 1 mounted upon the platform B, the crank shaft 2 having a gear wheel 3 in mesh with a larger gear wheel 4 on a shaft 5, said shaft also carrying a sprocket wheel 6 which transmits rotary motion to the sprocket wheel 7 mounted on the traction wheel axle C by means of a sprocket chain 8. When used, the engine is controlled by the operator from the seat W through well known types of levers, clutches, &c., which form no part of our invention. The kind of motive power employed is immaterial, provided means are present for controlling the speed of the machine.

It will be seen from the drawings that the machine or harvester occupies three furrows when in use, each of the three seats being located between two rows of cotton plants so that each picker can gather or pick the cotton from one side of each two rows of plants at the left and at the right as the machine moves along. Each of the two outside pickers obviously gathers the cotton from one side only of an outer row, which rows are outside the machine. While the number of seats for pickers shown is three, more may be provided and disposed as desired.

Each picker is seated upon a swiveled seat which accommodates itself to the various movements of the picker, thus avoiding distortions of the body and arms, which latter are both free for use. As the cotton is gathered it is immediately deposited in the elevator or conveyer hoppers 9 secured upon the uprights in front of the pickers. Journaled within each hopper is a rotary shaft 10 around which passes an endless elevator belt or conveyer 11 provided with devices, such as plates or the like, which seize the cotton and convey it to and drop it in the bin or receptacle R at the top of the machine. The three endless elevator belts or conveyers are moved by pulley bearings 12 upon a rotary shaft 13 journaled in bearings supported by the bin frame, as shown. As disclosed by Fig. 1, each pulley bearing 12 on the shaft 13 is located inside the bin R, and an inclosing casing for each endless belt (shown in section, Fig. 1) extends from the bin R to a hopper 9, the upper end of each casing being open to the bin and the lower end being open to a hopper 9 only. Obviously, the wind or gravity cannot remove the picked cotton while being transferred by the belt and on its way to the bin. On the end of shaft 13 is a sprocket wheel 14 which is engaged by a sprocket chain 15 which receives motion from a sprocket wheel 16 on a shaft 17 journaled in the frame and provided at the end with a beveled gear wheel 18 in mesh with a beveled gear wheel 19 on a vertical shaft 20 having at the top end a sprocket wheel 21. This latter sprocket wheel receives motion from a sprocket chain 22 engaging a sprocket wheel 23 on a vertical shaft 24 suitably mounted in bearings and carrying a beveled gear wheel 25 in mesh with a beveled gear wheel 26 on shaft 27 rotatable in a bearing 28 and on this shaft is a sprocket wheel 29. Power is transmitted to this sprocket wheel 29 by a sprocket chain 30 passed over a sprocket wheel 31 on the axle C of the traction wheel. A clutch of any type may be provided for throwing the sprocket wheel on the traction wheel axle out of gear, or the clutch may be located elsewhere.

It should be noted that the sprocket wheel

23, shaft 24, wheels 25, 26, shaft 27 and sprocket wheel 29 are supported by a frame (see Fig. 3) mounted on the platform B, the shaft 24 being vertical and in direct line with the king bolt K by which the end of the main frame is pivoted to the platform B. Obviously, the platform and traction wheel can be turned by the operator without interferring with the transmission of power through the sprocket chain 22.

After the bin or receptacle is filled with cotton it is quickly emptied by pushing the cotton through the circular opening in the bottom of the same and the chute into bags or other receptacles, thus keeping the cotton clean.

In the machine as illustrated we have provided curved plates 32 upon the rear end of the frame which deflect or bend the tops of the cotton plants downwardly when high and prevent the injury of the same and the tearing or scraping off of the blossoms or bolls by the sharp corners or edges of the frame.

From the foreging description and the illustrations of the embodiment of the invention it becomes clear that we have provided a mechanism and devices adapted for use in attaining the ends set forth as the object of our invention. Obviously modifications and additions may be made and unsubstantial changes and substitutions be introduced in the practical application of the principle without constituting departures which will fall outside the scope of the claims.

What we claim is:

1. The combination in a cotton harvester, of a frame mounted upon wheels spaced to move between rows of cotton plants, one of said wheels being a traction wheel, means for pivotally connecting the traction wheel to one end of the frame, means for turning said traction wheel about its pivotal center and relative to the frame, seats for pickers supported by said frame and located between the rows of plants, a bin or receptacle on the frame, a hopper supported adjacent each seat, an inclosing casing extending from each hopper to the bin one end of said casing being open into the bin and the other end open to the hopper, devices located within the hoppers, casings and bin for transferring the cotton picked by hand from the hoppers to the bin, gearing for operating said transferring devices, and means for transmitting motion from said pivoted traction wheel to said gearing.

2. The combination in a cotton harvester, of a frame mounted upon wheels spaced to move between rows of cotton plants, one of said wheels being a traction wheel, a platform supported by the traction wheel, means for pivotally connecting the platform to the end of the frame, means in connection with the platform and frame for turning said platform and traction wheel about the pivotal center for steering, seats for pickers supported by said frame and located between the rows of plants, a bin or receptacle on the frame, a hopper supported adjacent each seat, a hollow casing extending from each hopper to the bin one end of said casing being open into the bin and the other end open to the hopper, means for transferring the cotton picked by hand from the hoppers to the bin, gearing for operating said transferring means, and means for transmitting motion from the platform carried by the traction wheel to said gearing which operates the said cotton transferring means.

3. A cotton harvester having a frame supporting seats for pickers and mounted upon wheels, a bin, devices for transferring the cotton picked by hand to the bin, a traction wheel and platform to which the front end of the platform is pivoted, means for steering the wheel and platform, a motor on the platform for propelling the harvester, and transmission mechanism between the platform and the said transferring devices.

4. A cotton harvester comprising a frame mounted upon wheels spaced to move between rows of cotton plants, seats for pickers located between the rows, and pilots in front of the seats adapted to raise the lower branches of the plants to positions where the cotton on said branches can easily be reached by the hands of the pickers.

5. A cotton harvester comprising a frame mounted on wheels, the front wheel being a traction wheel, said wheels being spaced to move between rows of cotton plants and said traction wheel provided with a deflecting pilot for raising and deflecting the lower branches of the plants from the path of the wheel.

6. A cotton harvester comprising a frame mounted upon wheels spaced to move between rows of cotton plants, said frame being provided with deflecting plates or devices for bending over the tops of the taller plants so as to avoid detaching or injuring the blossoms and bolls upon said tops.

7. A cotton harvester having a frame mounted upon wheels one of which is a traction wheel having an axle, a platform secured to the traction wheel, means as a king bolt for pivoting one end of the frame to the platform, seats upon the frame for pickers, a receptacle for the picked cotton, devices for transferring the cotton from positions adjacent the seats to the receptacle, and means for transmitting power from the traction wheel axle to the said transferring devices.

8. A cotton harvester comprising a frame mounted upon wheels one of said wheels having secured thereto a platform movable with said wheel, means as a king bolt for

pivoting said frame to said platform, power actuated devices upon the frame for transferring picked cotton to a receptacle carried by the frame, means for transmitting power from mechanism mounted on the platform to said devices for transferring the cotton, one element of said means being located upon the platform and substantially coinciding with the axis of the king bolt whereby said platform and wheel may be turned through the arc of a circle without interfering with the transmission means.

9. The combination in a cotton harvester, of a frame mounted upon wheels spaced to move between rows of cotton plants, one of said wheels being a traction wheel, a platform supported by the traction wheel, means for pivotally connecting the platform to the end of the frame, means for steering the traction wheel and platform, seats for pickers supported by the frame, a bin carried by the frame, hoppers one located adjacent each seat, a hollow casing connecting each hopper with the interior of the bin, means for transferring the cotton picked by hand from the hoppers to the bin, gearing for operating the said transferring means, a motor on the said platform, means for transmitting motion from the motor to the traction wheel, and means for transmitting motion from the pivoted traction wheel and platform to the said gearing for operating the said cotton transferring means.

In testimony whereof we affix our signatures.

ALVIN E. STARK.
MYERS A. GARRETT.

June 24, 1930. S. W. VOLLINK 1,765,469

TRANSPLANTING MACHINE

Original Filed Feb. 27, 1928

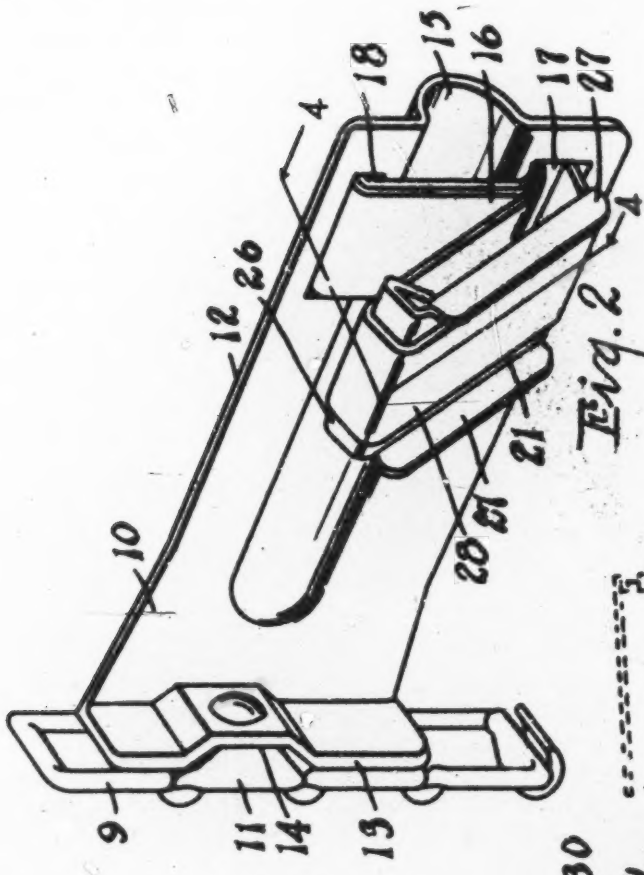

Fig. 2

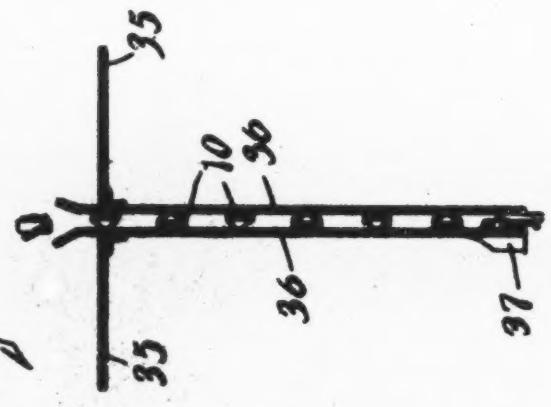

Fig. 5

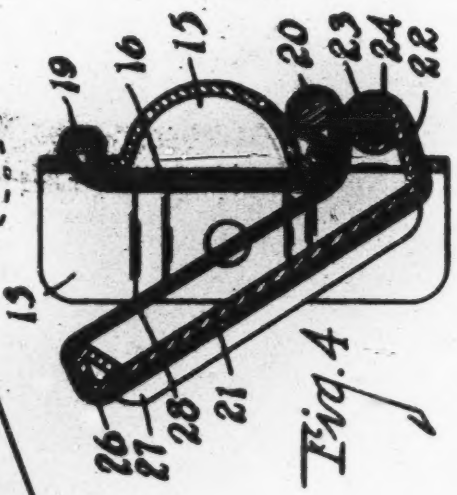

Fig. 4

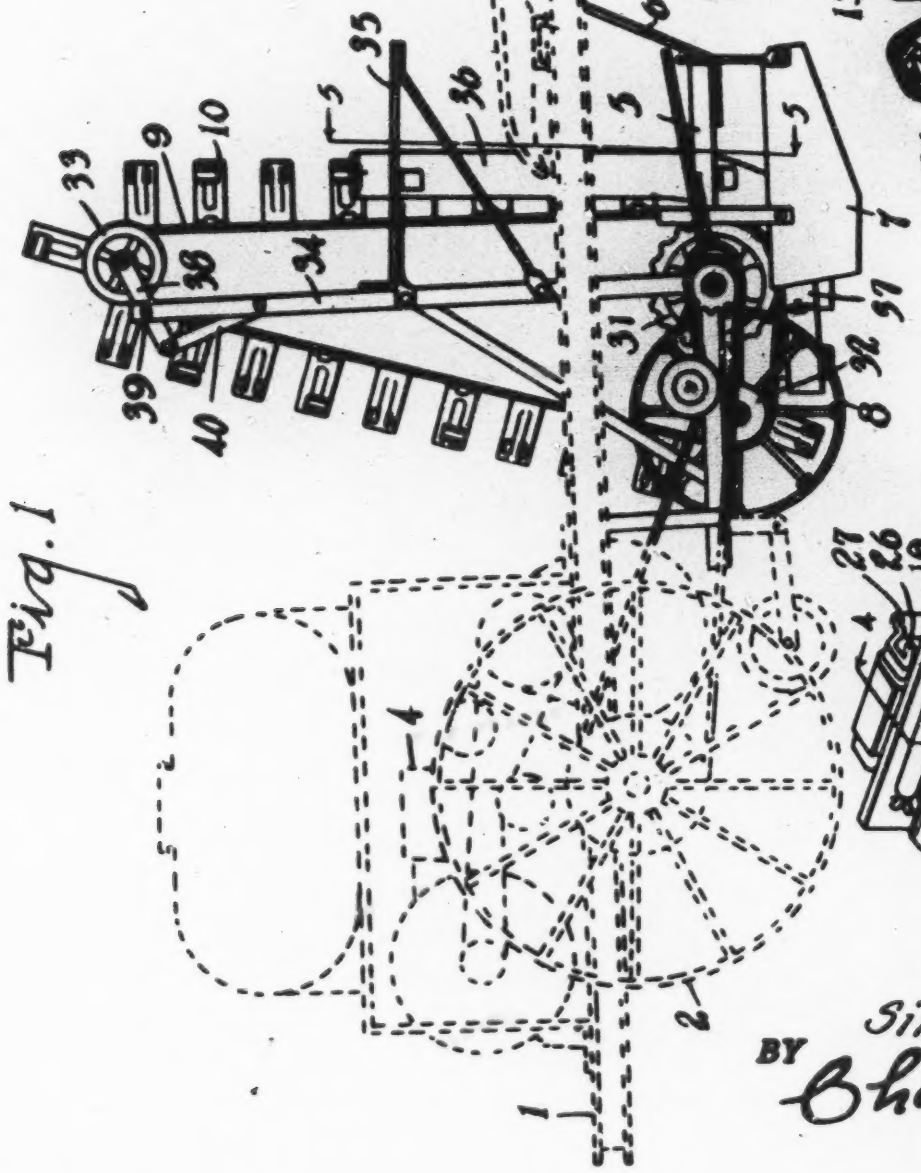

Fig. 1

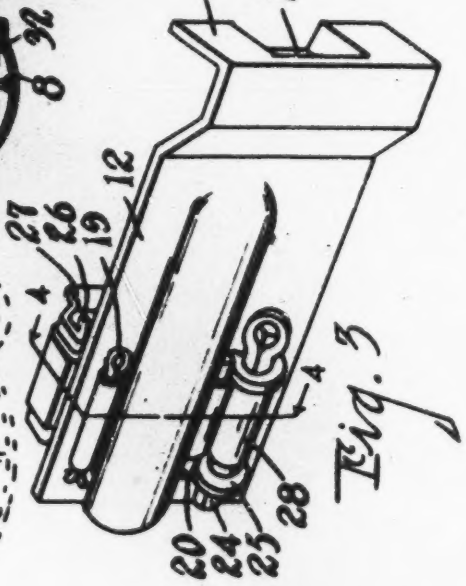

Fig. 3

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UNITED STATES PATENT OFFICE

SIMON W. VOLLINK, OF ZEELAND, MICHIGAN

TRANSPLANTING MACHINE

Original application filed February 27, 1928, Serial No. 257,382. Divided and this application filed May 8, 1929. Serial No. 361,425.

This invention relates to improvements in transplanting machines of the type shown in my application for Letters Patent filed February 27, 1928, Serial No. 257,382, the present application being a division of said application.

The main objects of this invention are:

First, to provide a transplanting machine adapted for the transplanting of relatively small and delicate plants such as celery, beets, cabbage, tomato plants and the like which handles the plants without injury thereto.

Second, to provide a machine of this character which is of very large capacity.

Objects relating to details and economies of my invention will appear from the description to follow. The invention is defined and pointed out in the claims.

A structure which is a preferred embodiment of my invention is illustrated in the accompanying drawing, in which:

Fig. 1 is a side elevation of a structure embodying the features of my invention, portions not directly concerned with the subject matter of this application being shown by dotted lines.

Fig. 2 is a perspective view of a fragment of the conveyor, showing one of its plant holders.

Fig. 3 is a rear perspective view of one of the plant holders.

Fig. 4 is a sectional view on line 4—4 of Figs. 2 and 3.

Fig. 5 is a fragmentary view partially in vertical section on line 5—5 of Fig. 1.

In the drawing similar reference characters refer to similar parts throughout the several views.

Referring to the drawing, 1 represents the main carrying or running gear frame which is designed to support the operating parts. This frame is provided with carrying and driving wheels 2 and carrying and steering wheel 3. The engine designated generally by the numeral 4 is mounted above the carrying wheels 2. The driving connections thereto are not described.

The machine is provided with a sub-frame designated generally by the numeral 5 and is supported at its front end by the draw bars 6. On this sub-frame I mount a furrow opener 7 and at the rear of the furrow opener are press wheels 8. These parts are illustrated and described in detail in my said application.

The plants are delivered into the furrow formed by the furrow opener in proper relation to the press wheels by means of a conveyor consisting of a chain 9 carrying a plurality of holders designated generally by the numeral 10. These holders are mounted in spaced relation on the chain as may be desired according to the spacing of plants required.

The holders are carried by base members 11 designed to replace one of the links of the chain so that a different set-up or spacing is easily had.

The holders comprise body members 12 formed, in the embodiment illustrated, as sheet metal stampings and have flange-like base portions 13 at their inner ends recessed at 14 to receive the base member 11. The ends of these flanges overlap adjacent links as illustrated in Fig. 2 so that when the chain is taut the holders are supported substantially at right angles thereto.

The body members 12 have longitudinal channels 15 opening at the outer ends of the holders. Elastic gripping members 16 are disposed across these channels adjacent their outer ends. These gripping members are conveniently formed of elastic bands of proper width, the ends of which are disposed through holes 17 and 18 on opposite sides of the channel 15 and retained by the pins 19 and 20 which are disposed through the bights of the bands, as shown in Fig. 3.

The holders are provided with pivoted jaws 21, also preferably formed as sheet metal stampings and having rearwardly projecting flanges 22 at their inner ends disposed through the opening 17 and terminating in knuckles 23 engaged by the pivots 24 which are carried by ears 25 on the rear side of the body members of the holders. At their outer ends, the jaws 21 are provided with inwardly projecting flanges

26 and along their sides with out-turned flanges 27.

Resilient or elastic grippers 28 are arranged around the jaws and owing to their being arranged over the flanges at the ends of the jaws, are supported thereby, providing elastic gripping faces. These bands engage the inner edges of the holes 17 so that they act as springs for holding the jaws normally in open position. This arrangement provides an effective means for holding the plants without injury thereto, even very delicate seedlings such as beets and the like.

The conveyor is driven so that as the holders are carried along the operator occupying the seat 30 places the plants within the jaws which are automatically closed thereon and carried by the holders to the point of delivery.

In the embodiment illustrated, the driving and supporting means for the conveyor consists of a driven sprocket wheel 31, guide pulley 32 on the axle of the press wheels 8 and the guide pulley 33 carried by the upright 34 so that the downwardly moving reach of the conveyor is approximately vertical and in front of the occupant of the seat 30 and tables 35 are provided for the plants.

The holders are closed and retained in closed position by a pair of spaced closing and retaining members 36, the upper ends of which project above the tables and are flared, as shown in Fig. 5. The operator lays the plants, top inward, between the resilient grippers preferably retaining his grasp on the same until the holders are carried between the closing members, which closes the jaws, the flanges 27 thereof engaging one of the closing members and receiving the wear, the rib resulting from the forming of the channel 15 receiving the wear on the other side.

The retaining members are curved rearwardly and have horizontal portions 37 conformed so as to release the holders in proper relation to the press wheels so that the soil is pressed around the roots of the plants partially at least while they are still supported by the holders. The speed of the conveyor is the same as the speed of travel of the machine over the surface of the ground so that there is no distortion or tilting of the plants.

The pulley 33 is carried by an arm 38 pivoted at 39 and adjustably supported by the link 40 so that the pulley is adjustably supported.

My improved transplanting machine is especially designed for the handling of delicate plants but it is also desirable for use in planting roots, bulbs or tubers, or plants in which sections thereof are used in propagation.

I have illustrated and described my improvements in an embodiment which is of very large capacity and highly efficient. I have not attempted to illustrate or describe certain embodiments or adaptations which I contemplate as I believe the disclosure made will enable those skilled in the art to embody or adapt the same as may be desired.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a structure of the class described, the combination of a conveyor provided with a plurality of holders, each comprising a body member having a longitudinal channel in its face and longitudinal openings at each side of said channel adjacent its outer end, an elastic band having its ends disposed through said openings and engaged by retaining pins disposed on the rear side of said body member providing a resilient gripper extending across said channel, a movable jaw having a rearwardly projecting flange at its inner end terminating in a pivot engaging knuckle, a coacting pivot mounted on the rear side of said body member, said jaw having an inwardly projecting flange at its outer end, an elastic band arranged longitudinally around said jaw between its said side flanges providing a yielding gripper and acting to yieldingly hold the jaw in its open position, the outer edge of the opening through which the jaw is arranged constituting a stop limiting the opening movement thereof, and spaced closing members disposed at the sides of the path of travel of said holders to close the jaws and retain them in closed position until the holders reach the point of delivery.

2. In a structure of the class described, the combination of a conveyor provided with a plurality of holders each comprising a body member having a longitudinal channel in its face and longitudinal openings at each side of said channel adjacent its outer end, an elastic band having its ends disposed through said openings and engaged by retaining pins disposed on the rear side of said body member providing a resilient gripper extending across said channel, a movable jaw having a rearwardly projecting flange at its inner end terminating in a pivot engaging knuckle, a coacting pivot mounted on the rear side of said body member, said jaw having an inwardly projecting flange at its outer end, an elastic band arranged longitudinally around said jaw between its said side flanges providing a yielding gripper and acting to yieldingly hold the jaw in its open position, and spaced closing members disposed at the sides of the path of travel of said holders to close the jaws and retain them in closed position until the holders reach the point of delivery.

3. In a structure of the class described,

a holder comprising a body member having a longitudinal channel in its face and longitudinal openings at each side of said channel adjacent its outer end, an elastic band having its ends disposed through said openings and engaged by retaining pins disposed on the rear side of said body member providing a resilient gripper extending across said channel, a movable jaw having a rearwardly projecting flange at its inner end terminating in a pivot engaging knuckle, a coacting pivot mounted on the rear side of said body, said jaw having an inwardly projecting flange at its outer end, and an elastic band arranged longitudinally around said jaw between its said side flanges providing a yielding gripper and acting to yieldingly hold the jaw in its open position, the outer edge of the opening through which the jaw is arranged constituting a stop limiting the opening movement thereof.

4. In a structure of the class described, a holder comprising a body member having a longitudinal channel in its face and longitudinal openings at each side of said channel adjacent its outer end, an elastic band having its ends disposed through said openings and engaged by retaining pins disposed on the rear side of said body member providing a resilient gripper extending across said channel, a movable jaw having a rearwardly projecting flange at its inner end terminating in a pivot engaging knuckle, a coacting pivot mounted on the rear side of said body member, said jaw having an inwardly projecting flange at its outer end, and an elastic band arranged longitudinally around said jaw between its said side flanges providing a yielding gripper and acting to yieldingly hold the jaw in its open position.

5. In a structure of the class described, the combination of a conveyor provided with a plurality of holders each comprising a body member having a longitudinal channel in its face and longitudinal openings at each side of said channel adjacent its outer end, an elastic band having its ends disposed through said openings and engaged by retaining pins disposed on the rear side of said body member providing a resilient gripper extending across said channel, a movable jaw having a rearwardly projecting flange at its inner end terminating in a pivot engaging knuckle, a coacting pivot mounted on the rear side of said body member, said jaw having an inwardly projecting flange at its outer end, an elastic band arranged longitudinally around said jaw between its said side flanges providing a yielding gripper, and means for closing the jaws and retaining them in closed position during predetermined periods of travel.

6. In a structure of the class described, a holder comprising a body member having a longitudinal channel in its face and longitudinal openings at each side of said channel adjacent its outer end, an elastic band having its ends disposed through said openings and engaged by retaining pins disposed on the rear side of said body member providing a resilient gripper extending across said channel, a movable jaw having a rearwardly projecting flange at its inner end terminating in a pivot engaging knuckle, a coacting pivot mounted on the rear side of said body member, said jaw having an inwardly projecting flange at its outer end, and an elastic band arranged longitudinally around said jaw between its said side flanges providing a yielding gripper.

7. In a structure of the class described, a holder comprising a body member having a longitudinal channel in its face, an elastic gripper disposed transversely across said channel, a movable jaw having a rearwardly projecting flange at its inner end disposed through said body member at one side of said channel, a pivot engaging said flange, said jaw having an inwardly projecting flange at its outer end, and a yielding gripper extending between said flanges in opposed relation to said gripper on said body member and acting to yieldingly hold the jaw in its open position.

8. In a structure of the class described, the combination of a conveyor provided with a plurality of holders, each comprising a body member having a longitudinal channel in its face, a yielding gripper supported at its ends disposed transversely across said channel, a jaw pivotally mounted on said body member to swing transversely of said channel, and a resilient gripper on said jaw disposed in opposed relation to said gripper on said body member.

9. In a structure of the class described comprising a body member having a longitudinal channel in its face, a yielding gripper supported at its ends disposed transversely across said channel, a jaw pivotally mounted on said body member to swing transversely of said channel, and a resilient gripper on said jaw disposed in opposed relation to said gripper on said body member.

10. In a structure of the class described, the combination of a conveyor provided with a plurality of holders arranged with part of the holders facing in opposite directions and laterally of their path of travel, and each comprising a body members having a longitudinal channel in its face, an elastic gripper disposed across the channel adjacent its outer end, and a movable jaw pivotally mounted on said gripper to swing transversely thereof, said movable jaw being provided with an elastic gripper.

In witness whereof I have hereunto set my hand.

SIMON W. VOLLINK.

Feb. 19, 1946. N. JELDERKS 2,395,124

MACHINE FOR USE IN HARVESTING FRUIT FROM LOW GROWING PLANTS

Filed Dec. 22, 1944 2 Sheets-Sheet 1

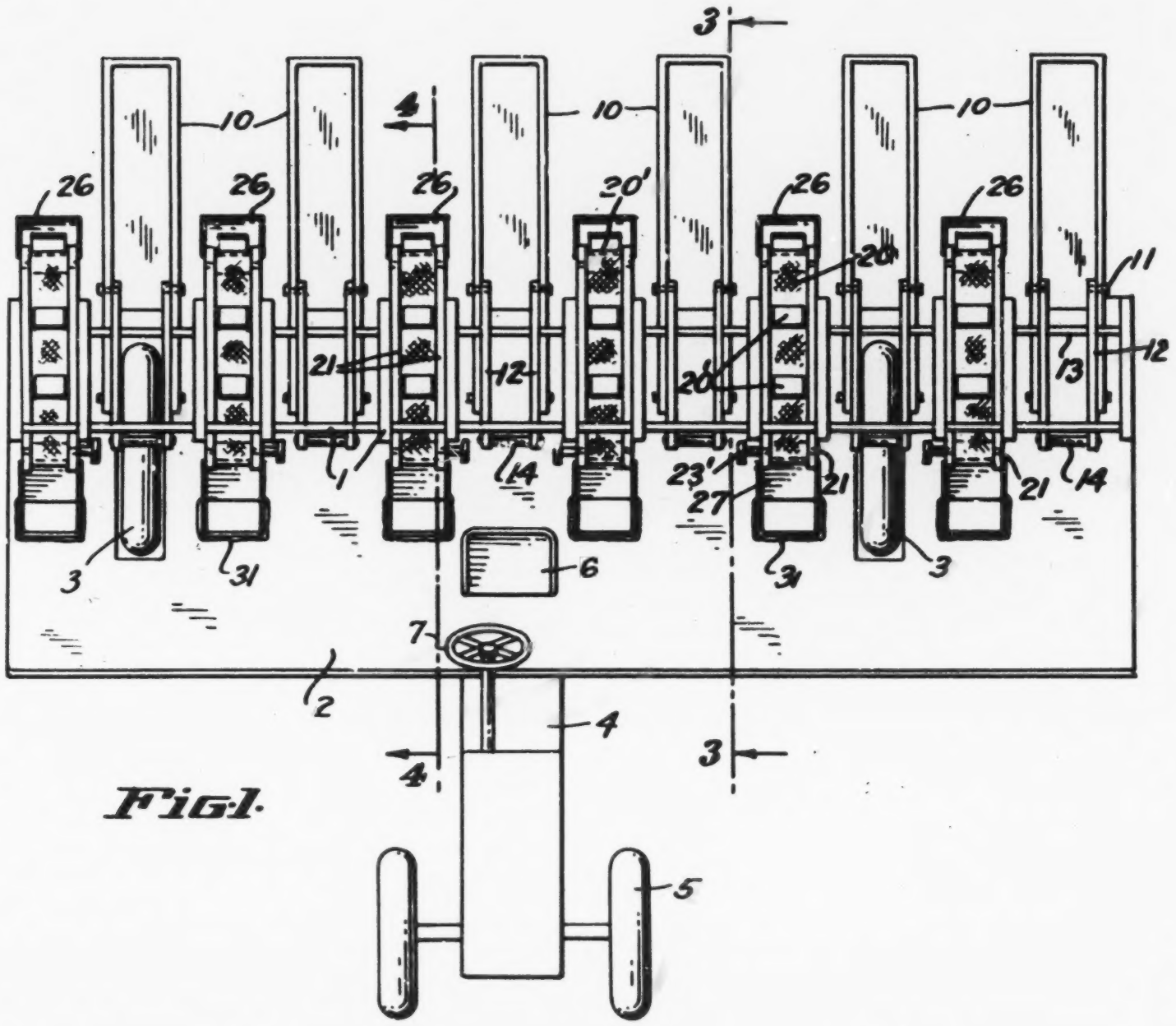

Fig. 1.

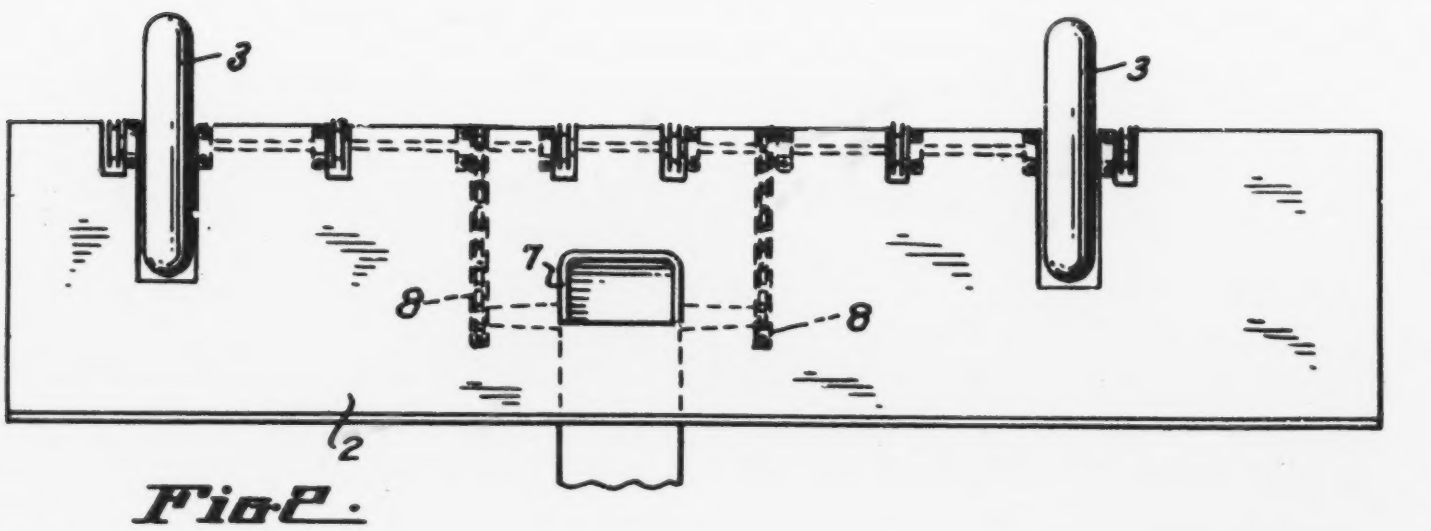

Fig. 2.

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Feb. 19, 1946. N. JELDERKS 2,395,124

MACHINE FOR USE IN HARVESTING FRUIT FROM LOW GROWING PLANTS

Filed Dec. 22, 1944 2 Sheets-Sheet 2

Fig.3.

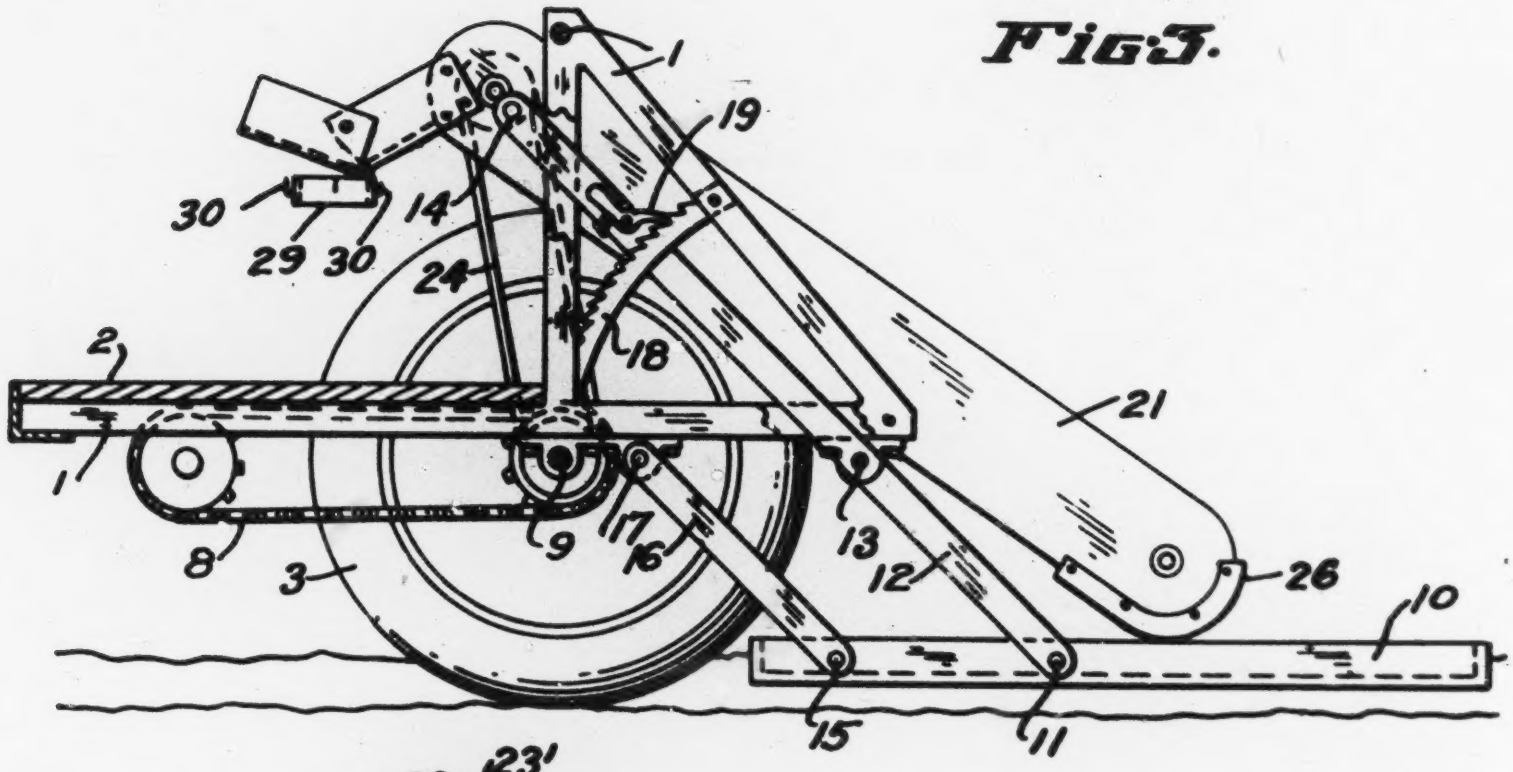
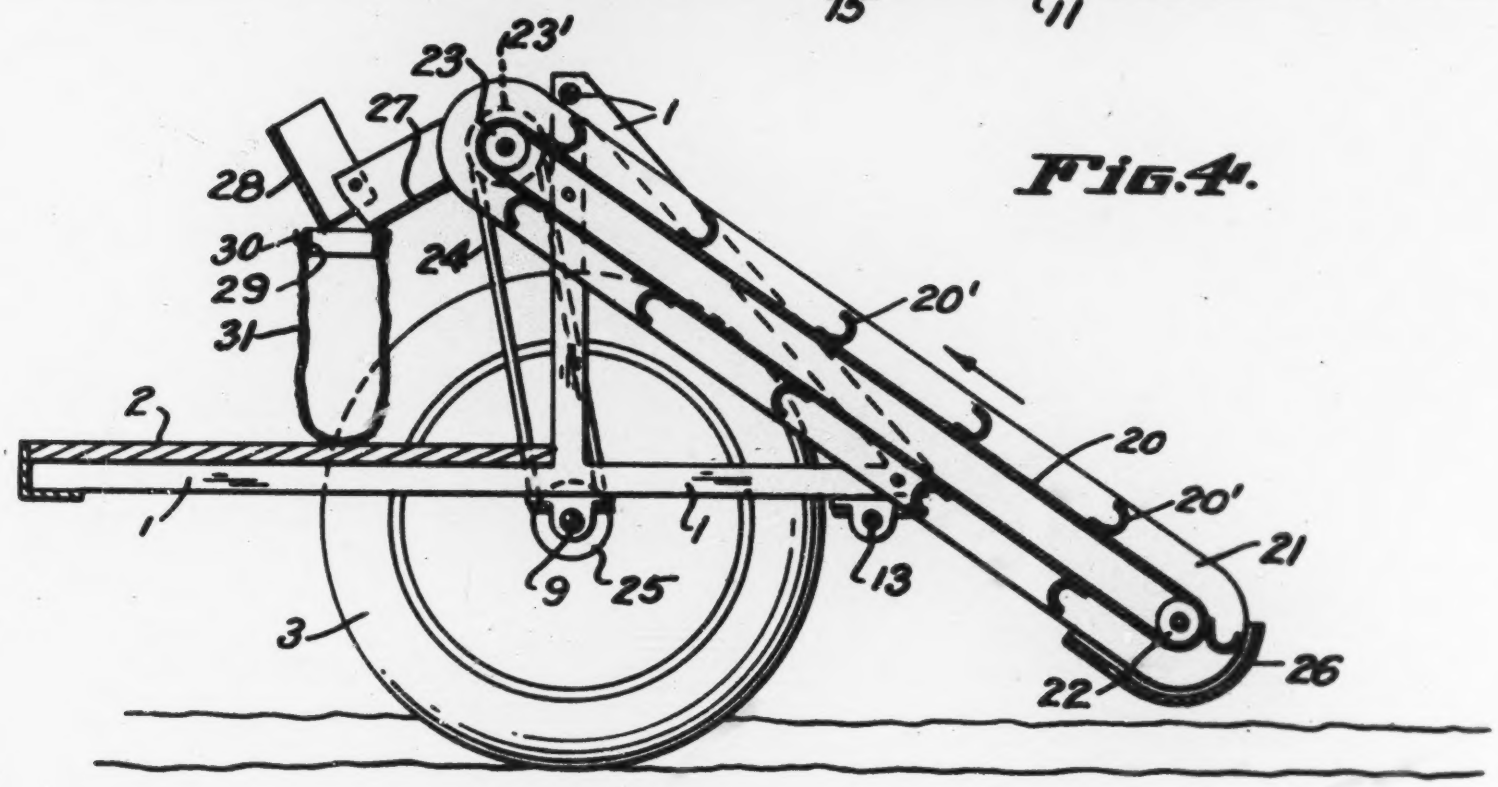


Fig.4.



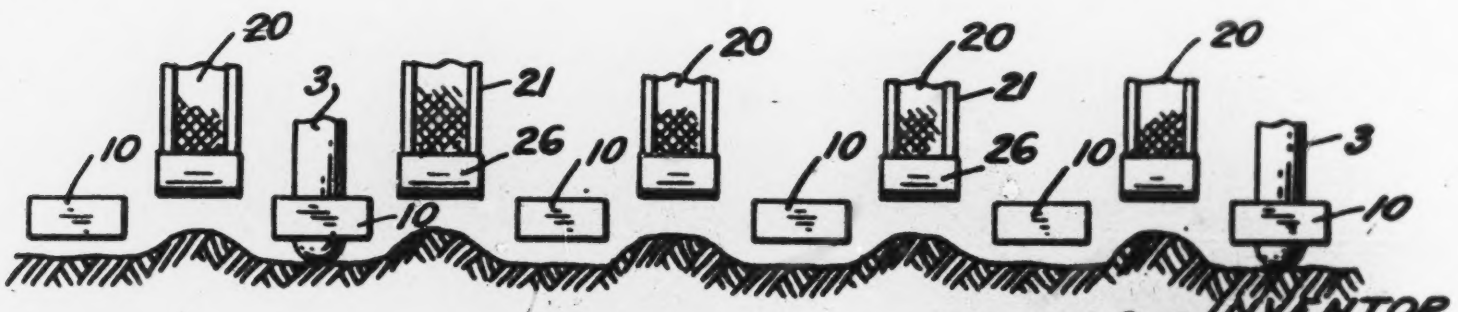


Fig.5.

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Patented Feb. 19, 1946 2,395,124

UNITED STATES PATENT OFFICE

2,395,124

MACHINE FOR USE IN HARVESTING FRUIT FROM LOW GROWING PLANTS

Neus Jelderks, San Jose, Calif.

Application December 22, 1944, Serial No. 569,662

4 Claims. (Cl. 214—83)

This invention relates to improvements in harvesting equipment, and more particularly to a novel machine for use in harvesting melons, cucumbers or other fruit from low growing plants.

An object of my invention is to provide an improved machine of the kind characterized having a novel conveyance upon which a number of pickers may be comfortably supported in positions where they can conveniently harvest the fruit growing on vines or other low growing plants arranged along the path of travel of the machine.

Another object of my invention is to provide an improved machine adapted for use in harvesting fruit or vegetables growing on low growing plants, having novel means for automatically conveying the picked fruits to points where it is sacked.

Other and further objects of my invention will be pointed out hereinafter, or will be indicated in the appended claims, or will be obvious to one skilled in the art upon an understanding of the present disclosure. For the purpose of this application I have elected to show herein certain forms and details of a fruit harvester representative of my invention; it is to be understood, however, that the embodiment of my invention herein shown and described is for the purpose of illustration only, and that therefore it is not to be regarded as exhaustive of the variations of the invention, nor is it to be given an interpretation such as might have the effect of limiting the claims, short of the true and most comprehensive scope of the invention in the art.

In the accompanying drawings:

Fig. 1 is a plan view of a machine embodying my invention;

Fig. 2 is a plan view of a part of the machine, showing the drive means in detail;

Fig. 3 is an enlarged sectional view taken on the line 3—3 of Fig. 1;

Fig. 4 is an enlarged sectional view taken on the line 4—4 of Fig. 1; and

Fig. 5 is a diagrammatic view showing the relative positions of certain parts of the machine with respect to the cultivated rows normally having the fruit bearing plants thereon.

Referring to the drawings the numeral 1 designates a supporting structure, 2 a platform carried at the forward end of the supporting structure, 3 the rear wheels upon which the platform and the supporting structure are mounted, and 4 a forwardly disposed chassis connected to the supporting structure and mounted on front wheels 5. A driver's seat 6 on the platform is positioned behind a steering wheel 7 connected in the usual manner to the front wheels 5. The power plant (not shown) for operating the machine is mounted on the chassis 4, and suitable means, including a chain and sprocket drive 8, connects the said power plant to a rotatable drive shaft 9 which is journaled on the supporting structure 1. The rear wheels 3 are keyed to the shaft 9, and suitable controls (not shown) are arranged within reach of the driver for connecting and disconnecting the power plant and the shaft to effect the control of the machine's forward movement and also the conveyors.

Adjustably carried on the supporting structure 1 are rearwardly disposed elongated spaced supports 10 which are adapted to support a number of fruit pickers or harvesters. The bed of each of the supports 10 is designed to support a person in a comfortable position near the ground level where he can reach the cucumbers or other fruit on plants growing in cultivated rows at opposite sides of intervening ditches. In normal usage the wheels 3 and 5, operate in the ditches between the rows of plants, and the supports 10 are also positioned between the said rows as the machine slowly moves forwardly. The supports 10 are arranged in substantially horizontal positions, and each is capable of independent vertical adjustment. Since the supporting and adjusting means for the supports is the same in each instance, a description of one will suffice for all. Pivotally connected to opposite sides of the support 10 just forwardly of its central part, as at 11, are spaced inclined bars 12. The bars are pivotally connected to a transverse rod 13 at the rear end of the supporting structure 1, and their rear ends are joined by a cross member 14 which serves as a handle for tilting the bars about 13 to raise or lower the supports 10. Pivotally connected as at 15 to the forward end of the support 10 are spaced links 16 which are connected as at 17 to the supporting structure 1. The distance between the pivots 15 and 17 associated with the links 16 is substantially the same as the intervening space between the pivots 11 and 13 of the bars 12. Thus when the forward ends of the bars 12 are raised or lowered the supporting structure will remain substantially horizontal. Suitable means for maintaining the support in an adjusted position comprises an arcuate rack 18 secured to the supporting structure 1, and a spring pressed pivoted pawl 19 carried by one of the bars 12. The pawl engaging with the teeth of the rack 18 prevents the upper ends of the bars 12 from being carried rearwardly beyond a certain adjusted position

when a picker is supported on the support 18. The support is thereby held in a suitably adjusted position with respect to the ground level.

Arranged between and at the sides of the supports 18 and their adjustable mounting means are a number of inclined endless conveyors 20 which receive the fruit deposited thereon and convey it to a location above the platform 2 where it is sacked. A number of spaced cups 29 are secured to each conveyor. Since the conveyors are the same, a description of one will suffice for all. Secured to the supporting structure 1 are two inclined parallel supporting members 21 arranged at opposite edges of the endless conveyor 20. The supporting members 21 provide sides at opposite edges of the conveyor for preventing the fruit being conveyed by the latter from dropping therefrom. The endless conveyor 20 extends over rotatable rollers 22 and 23 mounted, respectively, at the lower and upper ends of the supporting members 21. A pulley 23' connected to the upper roller 23 is connected by an endless belt 24 to a pulley 25 secured to the shaft 9. The rotation of the shaft 9 will cause the operation of the endless conveyor 20. Secured to the lower end of the supporting members 21 and positioned in spaced relation to the endless conveyor 20 is a receiving hopper 26. As the endless conveyor 20 travels as indicated by the arrow in Fig. 4, the cups 29' pick up the fruit deposited by the picker in the hopper 26 and support it while it is being conveyed in an upward direction. Some of the fruit may be deposited directly on the endless conveyor rather than in the hopper, and in such an event the cups will engage therewith and prevent it from sliding backwardly. It is to be noted that the speed of operation of the endless conveyor 20 may be increased or decreased by varying the respective sizes of the pulleys 23' and 25. If desired a suitable clutch mechanism may be provided with each conveyor for its independent connection or disconnection with respect to the shaft 9.

Secured to the supporting structure 1 and arranged to receive the fruit discharges from the upper end of the endless conveyor 20 is an inclined chute 27 having a pivoted tray 28 at its lower end. In normal practice the tray is positioned as shown in Fig. 4 so that it does not interfere with the discharge of fruit from the chute 27, but when it is desired to have the chute serve as a receptacle for holding some of the fruit delivered thereto by the endless conveyor, it is tilted backwardly as shown in Fig. 3. The fruit is thereupon intercepted by the tray and prevented from falling from the chute. Usually after a sack is filled it is necessary to replace it with one that is empty, and it is then that the tray is positioned to prevent the fruit delivered to the chute 27 from falling onto the platform. Supported on the lower end of the chute 27 is an open frame 29 having hooks 30 for securing the open end of a sack 31 in a position where it is adapted to receive the fruit falling from the chute.

It is contemplated that the machine be made up of a number of units comprising a support 18, a conveyor 20 and their related parts, provision being made for increasing or decreasing the number of such units depending upon the number of pickers required for harvesting the crop. In actual practice and operator standing on the platform 2 may attend to the filling of the sacks, which, after being closed at their upper ends, may be piled on the platform or placed on the ground at the side of the machine.

Having described my invention, what I claim is:

1. In a machine for the purpose described, a portable supporting structure mounted on wheels, a plurality of supports arranged in spaced relation above but near the ground level, the said supports being adapted to support fruit or vegetable pickers in positions where they are within reach of low growing plants, a plurality of inclined endless conveyors carried by the supporting structure and arranged with their receiving ends alongside the supports, means near the upper ends of the conveyors for receiving the produce discharged therefrom and a platform carried by the supporting structure and arranged to underlie and extend continuously beneath the discharge ends of the conveyors.

2. In a machine for the purpose described, a portable supporting structure mounted for movement over beds of plants from which their produce is to be harvested, a plurality of adjustable supports for fruit or vegetable pickers carried by the supporting structure and arranged in spaced relation above but near the ground level, means for adjusting the height of the supports, a plurality of endless conveyors carried by the supporting structure and arranged with their receiving ends alongside the supports and a platform carried by the supporting structure and arranged to extend continuously beneath the discharge ends of the conveyors.

3. In a machine for the purpose described, a portable supporting structure mounted for movement over beds of plants from which their produce is to be harvested, a plurality of adjustable fruit or vegetable picker supports carried by the supporting structure and arranged in spaced relation above but near the ground level, independent means for adjusting the height of each of the supports, endless conveyors mounted in spaced relation on the supporting structure and arranged with their receiving ends near the supports, means at the discharge end of the conveyors for receiving the produce discharged therefrom and a continuous platform extending beneath the produce receiving means.

4. In a machine for the purpose described, a vehicle having a supporting structure, a plurality of supports carried by the supporting structure and arranged in spaced relation in positions near but above the ground level, means for independently adjusting the height of the supports, and a plurality of endless conveyors arranged near the supports for receiving the produce picked by the pickers.

NEUS JELDERKS.

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TOBACCO HARVESTER

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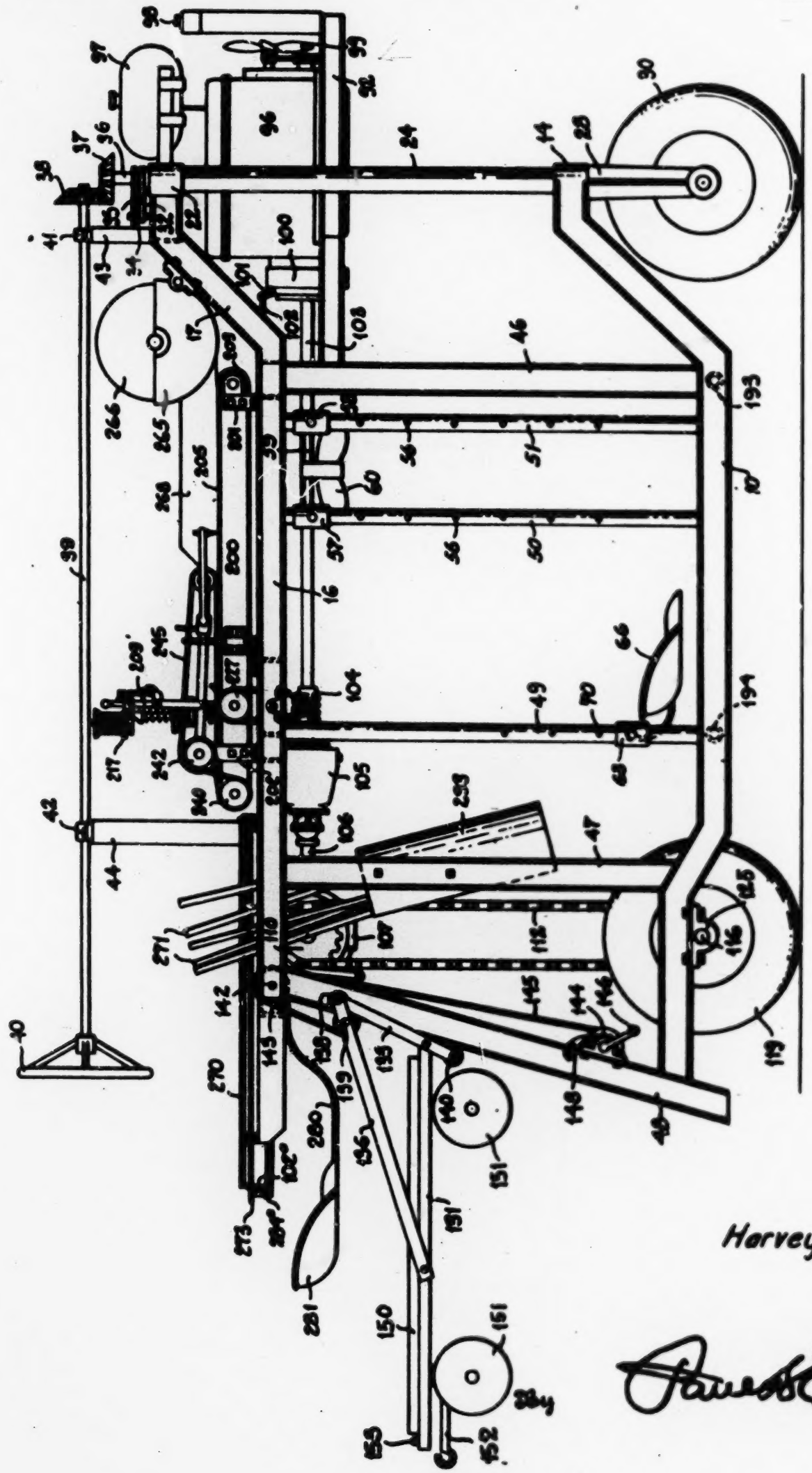

Fig- 1

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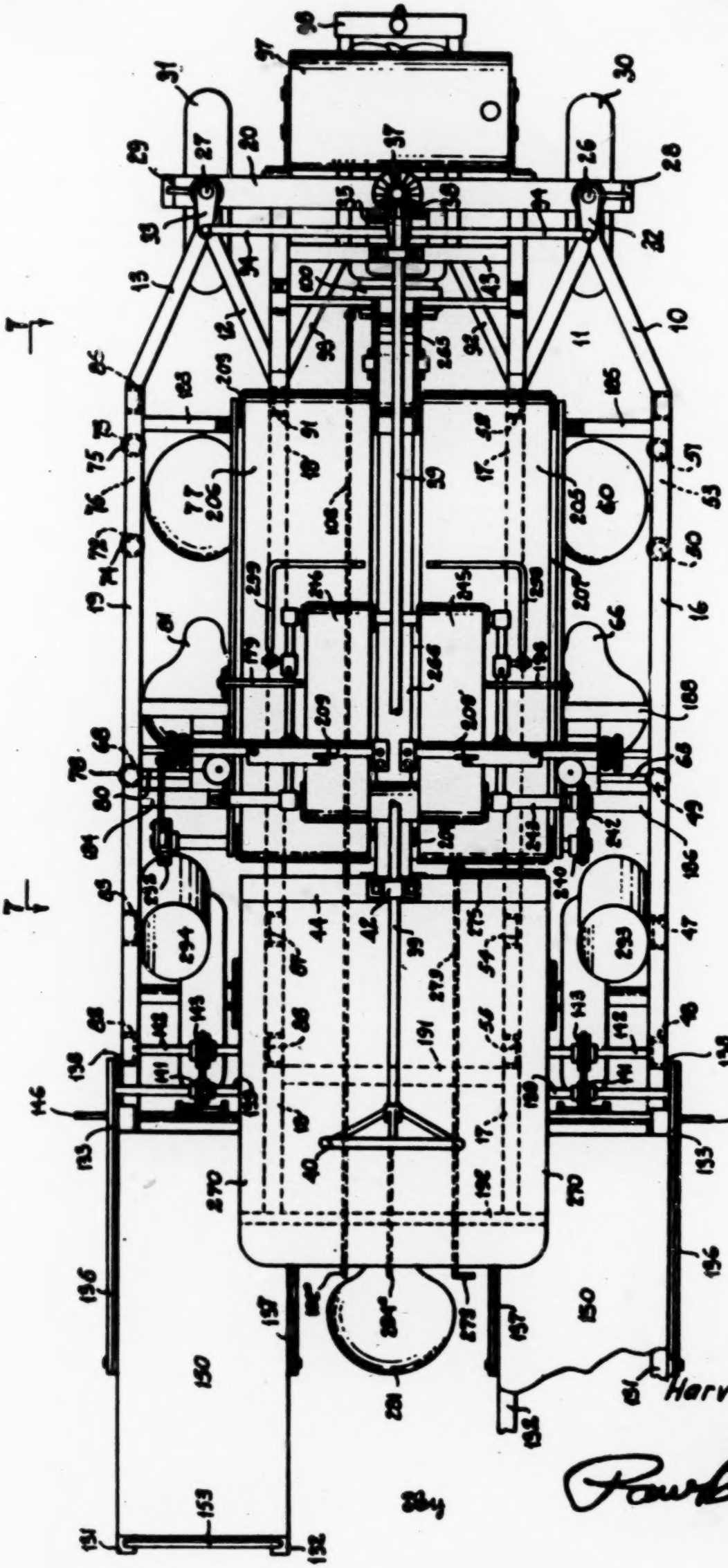

Fig. 2

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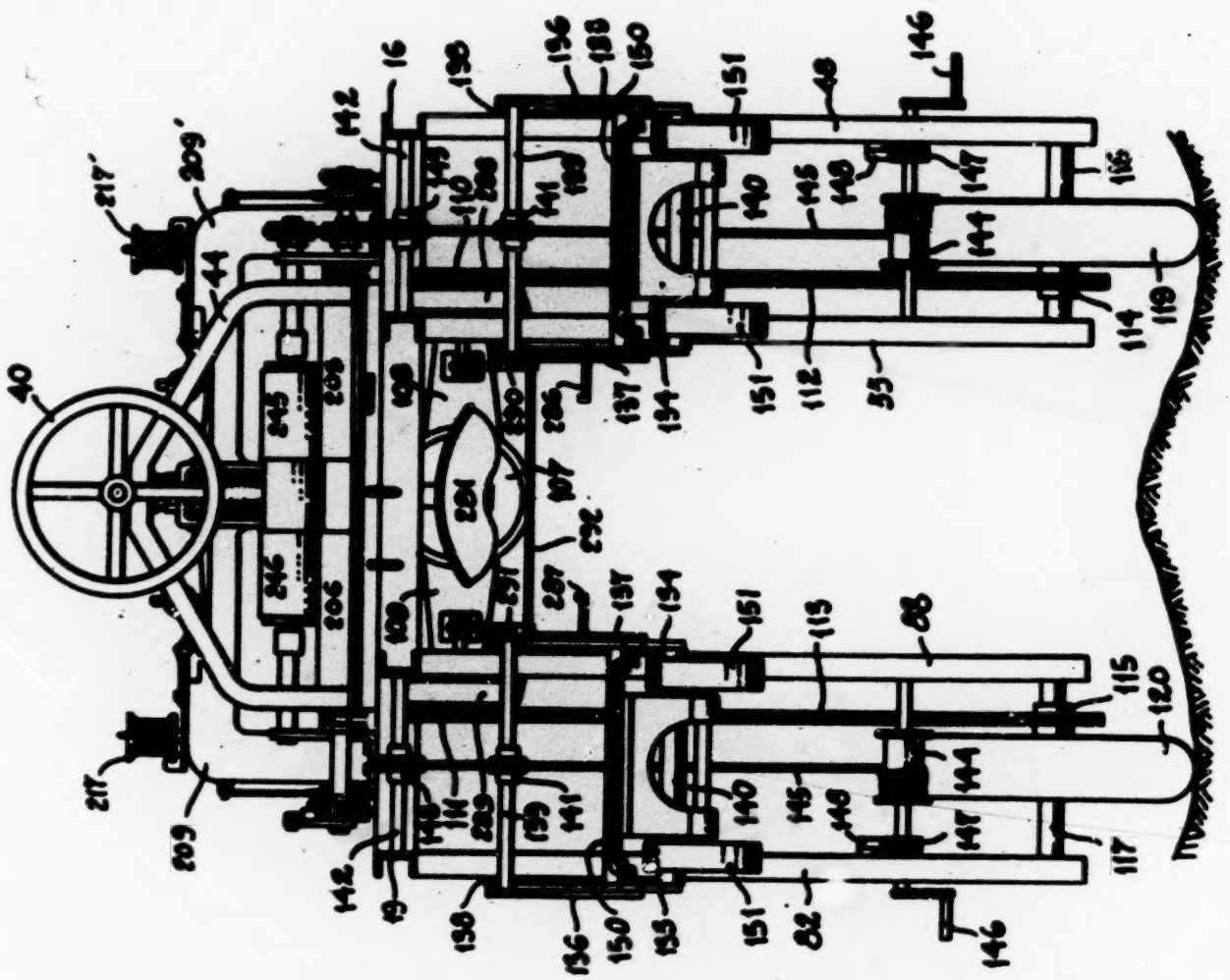

Fig. 4

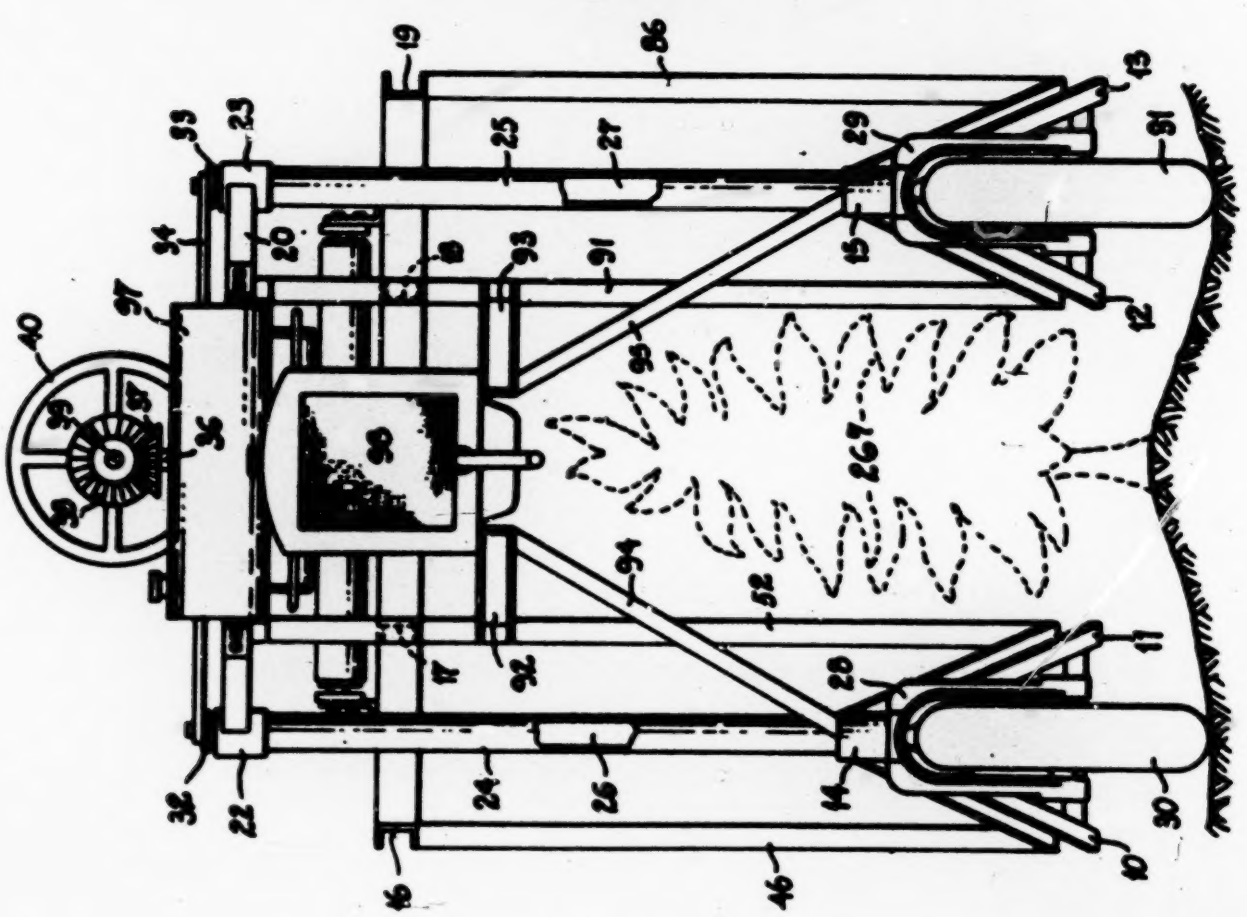

Fig. 3

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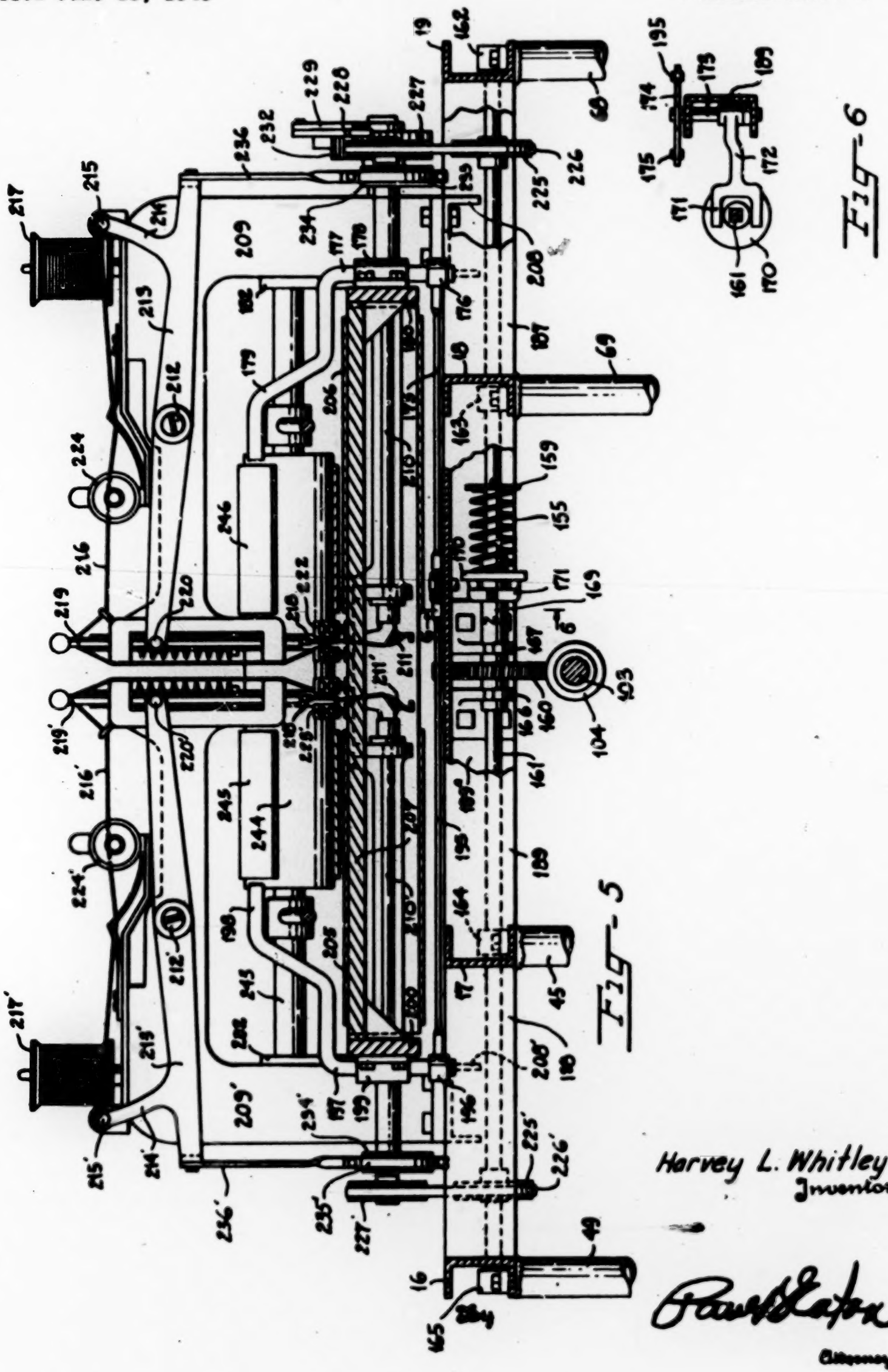

Fig. 6

Fig. 5

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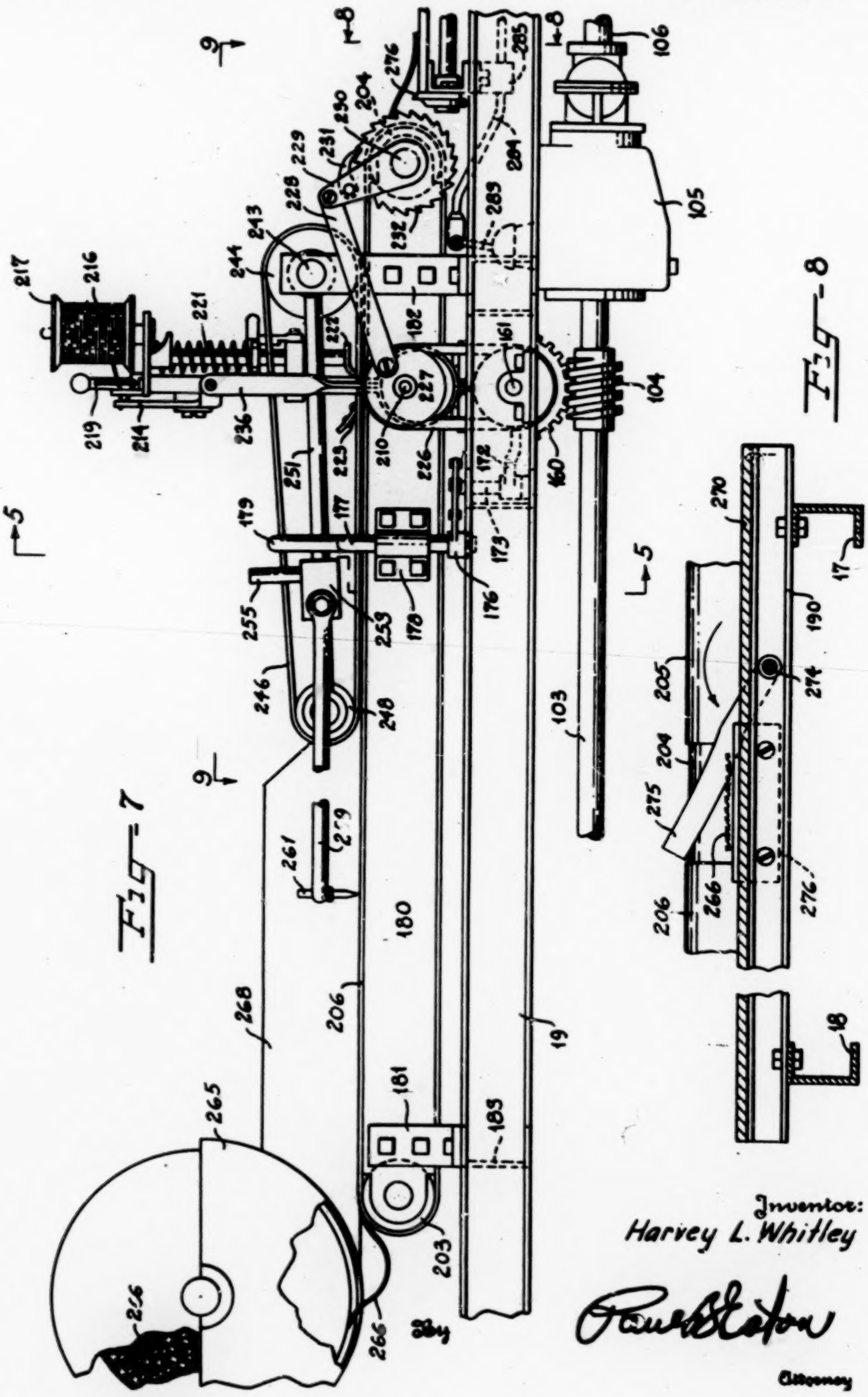

Fig-8

Fig-7

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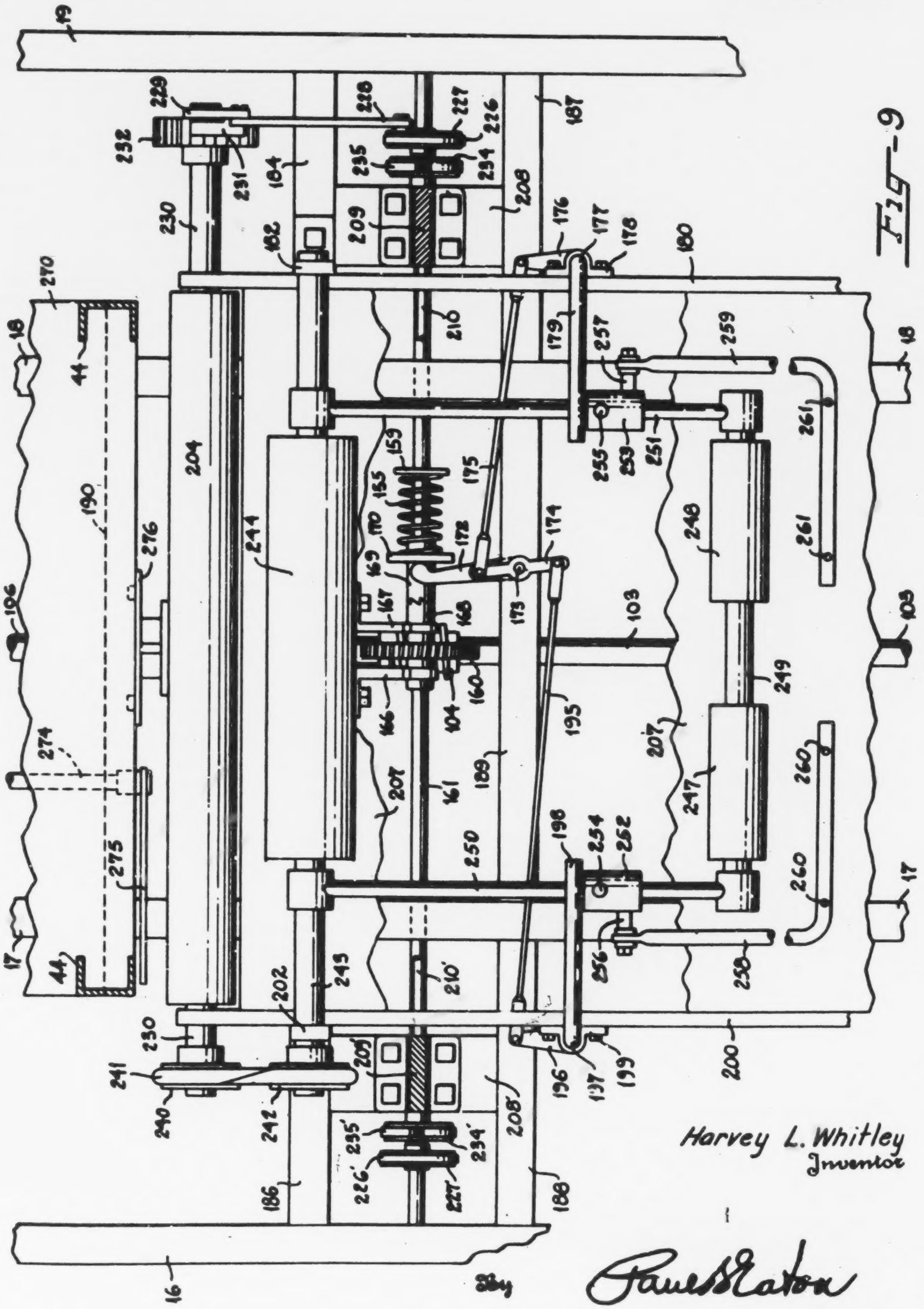

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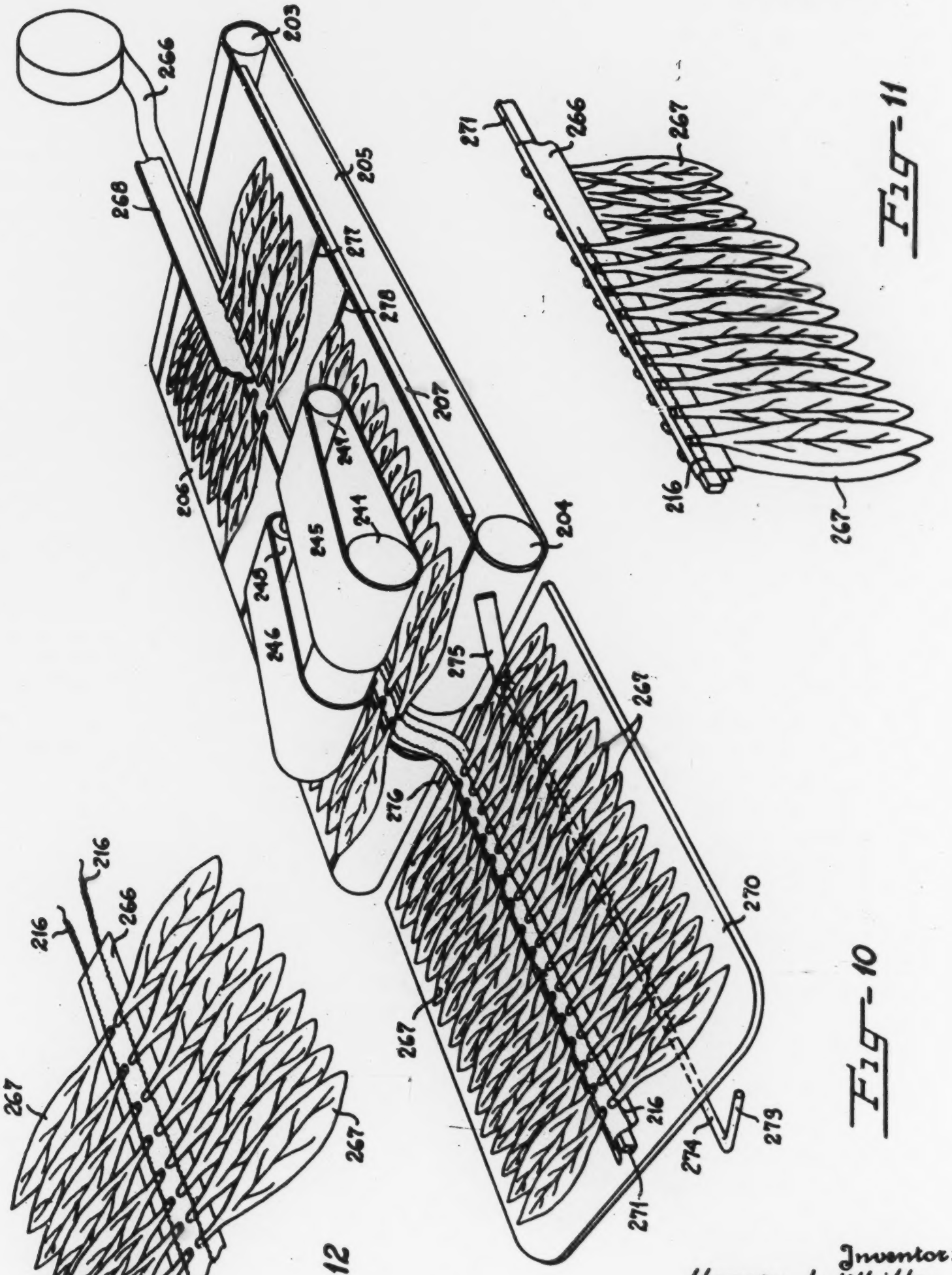

Fig- 10

Fig- 11

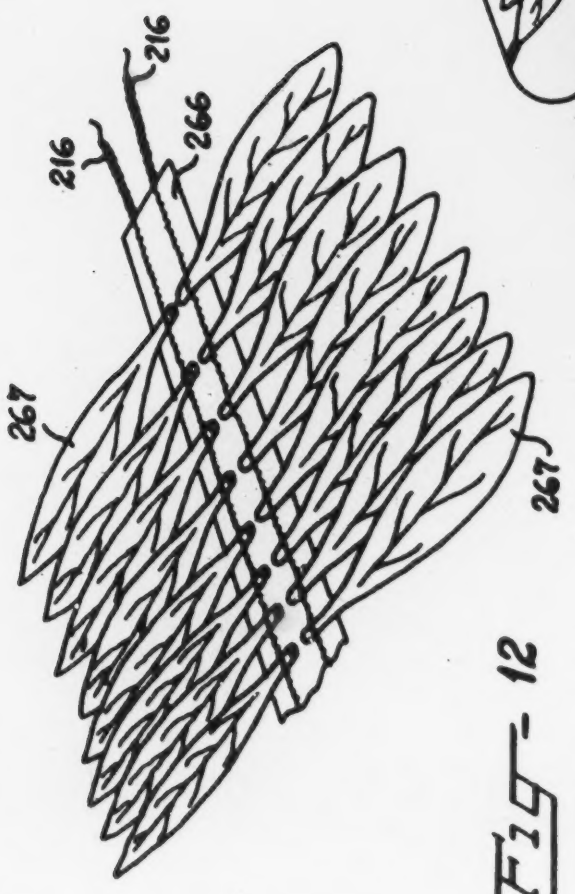

Fig- 12

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UNITED STATES PATENT OFFICE

2,518,965

TOBACCO HARVESTER

Harvey L. Whitley, Fremont, N. C.

Application June 13, 1946, Serial No. 676,524

8 Claims. (Cl. 214—5.5)

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This invention relates to a machine for gathering and stringing tobacco leaves in the field and depositing them onto a suitable tobacco stick instead of the conventional means heretofore employed of stripping the leaves from the tobacco stalks and depositing them into suitable baskets, trucks, and the like, which are drawn between the rows of tobacco, these baskets being transported to a suitable place where the bunches of leaves are strung onto the tobacco sticks by hand.

Briefly this invention comprises a wheeled self-propelled framework seating one or more operators on each side of a row of tobacco, which operators will pull the leaves from the tobacco stalks and hand them to other operators, who will deposit them onto a series of moving belts. The butt ends of the stems will be deposited onto a tape which is fed through two sewing machines, and the butts of the tobacco leaves will pass between suitable pressure applying means, while a pair of sewing machines forms a line of stitches passing through the butts of the tobacco leaves, and through the tape on which the butt ends of the stems of the tobacco are deposited. The tape with the butts of the tobacco leaves sewn thereto, passes rearwardly and is deposited onto a suitable tobacco stick, the tape resting on the tobacco stick and the leaves projecting from each side of the tobacco stick on a suitable platform. Then the tape is severed at the proper time and an operator lifts the tobacco stick and deposits it onto suitable trucks carried by the wheeled framework on each side of the operator. These trucks can be lowered to the ground for transporting to the tobacco barn.

It is an object of this invention to provide a tobacco harvesting apparatus, in which means are provided for seating a plurality of operators for gathering the leaves and depositing the same onto suitable conveyer means, and means are provided on the framework for sewing the butts of the tobacco leaves to a suitable tape and depositing the tape onto a suitable tobacco stick, and severing the tape at intervals so that the filled tobacco stick can be removed from position and deposited on suitable trucks carried by the wheeled framework, and another tobacco stick inserted in position for receiving the tape being filled with tobacco leaves sewn thereto.

It is another object of this invention to provide a tobacco harvesting apparatus comprising a self-propelled wheeled framework with a prime mover mounted on the framework for driving the framework over the ground at a very low speed, and also for driving suitable sewing mechanisms for sewing tobacco leaves to a suitable tape. The framework also carries a seat on each side of the row, which is straddled by the framework, and an operator on each side of a row of tobacco picks the leaves from the stalks of tobacco and

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hands them to other operators seated at a higher level on the wheeled framework, the upper operators depositing these leaves in butt to butt relation against a suitable guide strip onto a suitable tape, and the tobacco leaves with butt ends deposited onto the tape are conveyed through a pair of sewing apparatus, which passes a line of removable chain stitches through the tape and through the butts of the tobacco stems. The tape with the tobacco leaves sewed thereto is deposited onto a suitable tobacco stick and severed at intervals so the tobacco stick filled with the tobacco leaves can be removed and deposited on a suitable truck carried by the wheeled framework, and which truck can be removed at intervals and another truck substituted when the trucks become loaded.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds, when taken in connection with the accompanying drawings, in which:

Figure 1 is a side elevation of the apparatus;

Figure 2 is a top plan view of Figure 1;

Figure 3 is a front elevation of the apparatus;

Figure 4 is a rear elevation of the apparatus;

Figure 5 is a vertical sectional view taken substantially along the line 5—5 in Figure 7;

Figure 6 is a sectional view taken along the line 6—6 in Figure 5, and showing some additional structure which projects forwardly of the section line along which Figure 5 is taken;

Figure 7 is an elevation of the front central portion of the machine taken substantially along the line 7—7 in Figure 2;

Figure 8 is a vertical sectional view taken substantially along the line 8—8 in Figure 7;

Figure 9 is a top plan view, with portion omitted, and taken substantially along the line 9—9 in Figure 7;

Figure 10 is a schematic isometric view of the upper central portion of Figure 1 and looking from the left hand side of the machine and towards the front of the machine;

Figure 11 is an isometric view of a portion of a tobacco stick with a section of the leaves sewn to the tape deposited thereon.

Figure 12 is an isometric view of a portion of the tape with the tobacco leaves sewed thereto and showing the lines of looped stitches extending from the tape to illustrate the formation of a continuous string.

Referring more specifically to the drawings, the numerals 10 and 11 indicate the bottom longitudinal frame members on one side of the carriage, while 12 and 13 indicate the longitudinal bottom frame members on the other portion of the wheeled framework, these at their forward ends projecting upwardly and being welded to suitable cuffs 14 and 15. The top frame members are indicated at 16, 17, 18, and 19 respectively.

The top frame members 17 and 18 project forwardly and upwardly and are welded to a suitable cross member 20.

The ends of the cross member 20 are secured, as by welding, to suitable couplings 22 and 23, which are secured on the upper ends of pipes 24 and 25, and which pipes are secured to the cuffs 14 and 15 at their lower ends.

Rotatably mounted within these pipes 24 and 25 are shafts 26 and 27, which have on their lower end forked members 28 and 29, in which front wheels 30 and 31 are rotatably mounted. The upper ends of shafts 26 and 27 have rearwardly projecting arms 32 and 33 secured thereto, which are connected by a link 34. Link 34 is pivotally connected to an arm 35, which arm is fixedly secured around a stud shaft 36 mounted in cross member 20, and on the upper end of shaft 36 is secured a bevel gear 37. Meshing with bevel gear 37 is another bevel gear 38, which is secured on the front end of a steering rod 39 having a steering wheel 40 on its rear end. The steering wheel is rotatably supported in bearings 41 and 42 secured in uprising strips 43 and 44, the uprising strip 43 being secured to the upper inner frame bars 17 and 18, whereas the strip 44 is secured to the table 270 onto which the tobacco leaves are deposited onto sticks, and which table will be later described.

The lower horizontally extending frame bar 10 and the upper frame bar 16 are secured together by means of suitable channel bars 46, 47 and 48, as well as by pipes 49, 50 and 51.

The upper frame bar 17 and lower frame bar 11 are connected together by vertical member 52, and by a pipe 45, as well as connecting channel members 54 and 55. The vertically disposed pipes 50 and 51 have a plurality of perforations 56 therein and a pair of sliding cuffs 57 and 58 connected together by a cross piece 59 slide on these pipes 50 and 51, and have suitably secured thereto a leaf positioner's seat 60, which can be adjusted vertically by placing pins through any given set of perforations 56 for adjusting the height of seat 60.

Likewise, vertical pipe 49 and vertical pipe 45 have mounted thereon cuffs 63 identical to cuffs 57 and 58 which have secured thereto a cross piece 65 on which a seat 66 is mounted, and pipes 49 and 45 are likewise perforated, as at 70, for adjusting the height of the seat 66 with reference to the bottom frame members 10 and 11.

The upper horizontal and longitudinally extending frame bar 19 and lower horizontally and longitudinally extending frame bar 13 have secured therebetween perforated pipes 72 and 73, which are perforated in the same manner as pipes 50 and 51, and slidably mounted on these pipes 72 and 73 are cuff members 74 and 75, joined together by a cross bar 76 to which is secured a seat 77 for a leaf placing operator.

Also secured between the upper bar 19 and lower bar 13 is a perforated pipe 68, and between upper bar 18 and lower bar 12 is another perforated pipe 69 and mounted on pipes 68 and 69 are cuff members 78 identical to cuffs 74 and 75 which are joined together by a cross piece 80, which is attached to a seat 81 for a leaf stripping operator.

The rear portions of bars 19 and 13 have secured therebetween channel bars 82 and 83, and between upper channel bar 18 and lower inner channel bar 12, there are secured similar channel bars 87 and 88. The front ends of the upper horizontal bar 18 and the lower bar 12 have

secured between their ends a channel bar 91. The front portions of upper bar 19 and lower bar 13 have secured therebetween an upright bar 86.

Welded to uprights 82 and 91 are a pair of inwardly and forwardly projecting members 92 and 93, which have secured to their intermediate portions brace bars 94 and 95, which project downwardly and have their lower ends welded to cuffs 14 and 15. These members 92 and 93 support a suitable internal combustion engine 96, which is supplied with fuel from a fuel tank 97.

The engine has a suitable radiator 98 and a cooling fan 99, and a clutch mechanism 100 with a clutch lever 101 with an operating rod 102 extending therefrom to within reach of the driver. Extending from the engine is a drive shaft 103, which has a worm 104 thereon, and extends into a suitable transmission 105 from which a drive shaft 106 extends to a suitable differential housing 107, which has axle housing 108 and 109 extending from each side thereof, in which suitable axles are mounted and on the outer ends of these axles are mounted sprocket wheels 110 and 111 on which are disposed sprocket chains 112 and 113, which extend downwardly and are connected to sprockets 114 and 115 disposed on shafts 116 and 117, and on which wheels 118 and 120 are mounted.

The wheel shafts 116 and 117 are mounted in suitable bearings 125 secured on the lower surfaces of longitudinally extending bars 10, 11, 12, and 13.

Mounted on the rear vertically and rearwardly extending frame bars 45 and 55 and 82 and 88 respectively, are suitable truck supporting mechanisms and like reference characters will apply to both sides of the machine. These truck supporting mechanisms comprise horizontal angle bars 131 and 132, which are fixedly secured at their front ends to upwardly and forwardly projecting bars 133 and 134, and secured to bars 131 and 133 is a support bar 136 and between bars 132 and 134 is support bar 137, the front ends of support bars 136 and 137, at their junction point with vertically disposed members 133 and 134, have rollers 138, which ride on the front surface of the rear flanges of the rearwardly and downwardly directed frame members 48 and 55 and 88 and 82 respectively depending upon which carriage is under consideration. Disposed between the lower ends of bars 133 and 134 are roller pipes 140, which ride on the rear surfaces of channel bars 48 and 55 and 88 and 82 respectively.

The support bars 136 and 137 have a transverse shaft 139 disposed therebetween on which a pulley 141 is mounted. On the rear ends of the upper horizontal bars, such as 16 and 17 or 18 and 19, are mounted transverse shafts 142 on which is mounted a pulley 143.

Secured to the lower front surfaces of each pair of the rearwardly directed bars 48 and 55 and 88 and 82 respectively is rotatably mounted a drum 144 to which is secured a cable 145, which is directed upwardly over pulley 143 and then around pulley 141 and has its end secured in a loose manner around shaft 143.

The drum 144 has a crank 146 for rotating the same, and it has a ratchet wheel 147 thereon with a dog 148 for holding it in adjusted position. Adapted to be supported on the angle bars 131 and 132 is a platform 150 of a wheeled truck having four wheels 151 and a tongue 152, by means of which it can be pulled along over the field and to which tongue 152 a draft animal can be at-

tached for rolling the truck to the tobacco barn, or it can be deposited on a larger truck for hauling to the tobacco barn.

The front ends of members 131 and 132 are joined together by having perforations therein, into which the downturned ends of a tie rod 153 may be hooked for holding the free ends of the same together, so as to confine the truck platform 150 in position.

When it is desired to remove the truck, when it is loaded with a plurality of tobacco sticks filled with tobacco, then by means of crank and drum 144 the carriage assemblies can be lowered to the ground and keeper 153 can be removed so that the truck can be pulled up from between the side bars 131 and 132.

Meshing with worm 164 is a worm gear 160 rotatably mounted on shaft 161, which is rotatably mounted in bearings 162, 163, 164, and 165. The worm gear 160 is confined between two brackets 166 and 167 secured to cross bar 169a, which also serve as bearings for the shaft 161. The worm gear 160 has a sleeve 168 extending therefrom, which is serrated to form one-half of a clutch, the other half of the clutch being serrated and indicated at 169. This portion 169 has a flange 170 against which a forked end 171 of a lever 172 is adapted to fit. The portion 169 is slidably keyed on shaft 161 and is normally urged into engagement with portion 168 by means of a compression spring 155 resting against a collar 159 secured on shaft 161. The lever 172 is fixedly mounted on a shaft 173, rotatably mounted in horizontal cross bar 169, and this shaft 173 has a double ended lever 174 secured on its upper end.

Pivotally connected to one end of lever 174 is a link 175, whose other end is connected to an arm 176 disposed on the lower end of a lever 177, which is rotatably mounted in bearing 178, this lever projecting upwardly and inwardly across the machine in the form of a crank 179. The bearing 178 is secured on the exterior of a board 180, supported by brackets 181 and 182, supported on cross bars 183 and 184, which are secured between bars 18 and 19. Bars 185 and 186, which are similar in all respects to bars 183 and 184, are secured between upper horizontal bars 16 and 17, in the same manner as described for 183 and 184.

A bar 187 is also secured between upper horizontal bars 18 and 19, and a bar 188 is secured between upper horizontal bars 16 and 17. Spanning the distance between upper longitudinal bars 17 and 18 is a cross bar 189a which is disposed immediately below roller 244. There is also a similar cross bar 190, which is disposed immediately underneath strap iron member 44, and also a cross bar 191 disposed adjacent, but below the steering wheel 48, and also a cross bar 192 disposed at the rear ends of the upper horizontal frame bars 17 and 18.

Suitable cross bars or pipes 193 and 194 are disposed between the bottom horizontal bars 10 and 11 and 12 and 13 respectively.

Secured to the other end of the lever 174 is a link 195 which extends to an arm 196 secured on the lower end of a shaft 197, which has an inturned handle portion 198, whereby an operator on each side of the machine has access to a handle 178 or 198 to release the clutch 169, as desired. The shaft 197 is mounted in the bearing 199, secured on the exterior surface of a board 200 supported by means of bracket 201 and 202, mounted on cross bars 185 and 186 in the same manner as bracket 181 and 182, or arms 176 and 196 can be moved by other mechanism to move clutch member 169, and which mechanism will be later described.

In the ends of the boards 180 and 200 are rotatably mounted rollers 203 and 204, on which lower conveyer belts 205 and 206 are mounted. Disposed between the side boards 180 and 200 is a top board 207, on which the upper layers of belts 205 and 206 rest. Welded between plate members 184 and 187 and 186 and 188 respectively are plates 208 and 208' on which are mounted the shanks of sewing machines 209 and 209'. A description of one of the sewing machines will now follow and like reference characters will apply to the other sewing machine with the prime notation added.

Mounted in the base portion of the sewing machine frame 209 is a looper shaft 210. This looper shaft 210 has a conventional looper 211 for making a conventional removable chain stitch loop, whereby the thread can be seized and the line of stitches separated by pulling on the thread. The sewing machines are not shown in detail because they are conventional chain stitch sewing machines, as shown in the patent to Dickerson No. 2,327,252 of 17th day of August 1943.

Shank 209 has pivotally secured thereto, as at 212, an oscillating arm 213, having an arm 214 with a suitable eye 215, through which thread 216 passes from a spool 217, arm 214 unwinding from the spool and causing proper feeding of the thread 216. Thread 216 passes to a conventional needle 218 on a needle bar 219, to which the oscillating bar 213 is pivotally connected, as at 220, and needle 218 penetrating a suitable throat plate.

The machine is also equipped with a conventional presser bar 221, having a presser foot 222 on its lower end, said presser foot being provided with rollers 223, so as to prevent the presser foot from injuring the tobacco leaves passing therebeneath. The thread 216 also passes through a conventional tension device 224.

Mounted on shaft 161 is a pulley 225, which has a belt 226 thereon, which is also mounted on a pulley 227 secured on looper shaft 210. This pulley 227 has a link 228 pivotally secured thereto, which projects rearwardly and is connected to an arm 229 fixed on a shaft 230 projecting from one end of roller 204, lever 229 being pivotally secured on shaft 230, and has a dog 231 pivotally secured thereon for engaging a ratchet wheel 232 secured on shaft 230 for imparting step by step movement to the conveyer belts 205 and 206 in timed relation to the movement of the sewing machine.

The looper shaft 210 also has fixedly secured thereon an eccentric cam 234 surrounded by annular member 235 to which is fixedly secured a link 236, which projects upwardly and is pivotally secured to the outer end of arm 213 for imparting oscillation thereto. Mounted on the other end of shaft 230 from the end on which ratchet wheel 232 is mounted, is a pulley 240 having a belt 241 thereon, which belt is also mounted on a pulley 242 mounted on a shaft 243, which shaft 243 is mounted in brackets 182 and 202.

On shaft 243 is a roller 244 on which the rear ends of conveyer belts 245 and 246 are mounted. The front ends of these conveyer belts 245 and 246 are mounted on rollers 247 and 248, which are in turn rotatably mounted on a shaft 249, which is secured in the front end of members 250 and 251 pivoted at their rear ends around shaft 243. Slidably mounted on links 250 and 251 are cuffs 252 and 253, which have rising upwardly therefrom pins 254 and 255 respectively and project-

ing outwardly from these cuffs 282 and 283 are pins 286 and 287, on which are pivotally secured forwardly projecting members 288 and 289, which are turned inwardly towards each other and have downwardly projecting pins 290 and 291 respectively therein, so that when an operator runs out of tobacco leaves to place on either one of the conveyer belts 206 and 206, he may let the shanks down onto the conveyer belt to where its pins will contact the belt and be moved along by the belt and this will cause a pin 284 or 285 to engage its associated lever 198 or 178 respectively, and move the clutch member 168 away from clutch member 166 to thereby stop operation of all conveyer belts and the sewing machine.

Mounted near the front portion of the machine is a pan 265 in which a roll of tape 266 is mounted for rotation, this type 266 being adapted to be led rearwardly beneath the needle and pressure feet so that the lines of stitches will penetrate side portions of the tape and sew the tobacco leaves 267 to the tape 266.

The tobacco leaves are placed on the conveyer belts 205 and 206 with the butt portions of their stems resting on the tape 266 and extending with their tips in opposite directions, so that their butts will be penetrated by the line of stitches and sewed to the tape 266. The feeding mechanism of the sewing machine will feed the tape 266 with the tobacco leaves sewed thereto rearwardly. The tape and tobacco leaves attached thereto will be deposited onto a platform or table 270, the tape being deposited onto a tobacco stick 271 disposed on the table 270.

Preferably the driver-operator will seize the tape 266 and pull it rearwardly as the tobacco leaves and tape are ejected from the sewing machine until the tobacco leaves and tape occupy the position, as shown in Figure 10, at which time the operator will seize a handle 273 on a shaft 274 rotatably mounted in cross bars 190 and 192. The front end of this shaft 274 has a knife 275 secured thereon, which as it is swung will pass across the tape 266 and sever the same.

It is to be noted that there will be spaces between certain lengths of the tape where there will be no tobacco leaves sewed, so that there will be a projecting end of the tape at each end of a bunch of tobacco leaves on a stick. The reason for this is that the tobacco leaves cannot extend to the ends of the sticks, as the ends of the sticks must be placed on tiers in a tobacco curing barn. In order to prevent the tobacco leaves from being deposited by the operators onto these designated portions, which must be left blank between a batch of leaves for one stick and a batch of leaves for another stick, the endless conveyers have certain markings indicated at 277 and 278, and the space between these markings 277 and 278 must be left devoid of tobacco leaves by the operators depositing the leaves thereon.

The knife 275 is adapted to cooperate with a fixed shearing blade 276 disposed at the front end of the platform 270, and below the tape 266.

Secured to the rear upper cross bar 191 is a spring steel member 280 having a seat 281 on its rear end to be occupied by the driver of the machine.

The rear end of the clutch rod 182 has an upturned crank portion 182a within reach of the driver whereby he can manipulate the clutch to stop the forward movement of the machine. The differential has projecting upwardly therefrom a conventional gear shift lever 282 to which is connected the upwardly and forwardly directed end

of a link 284, which is suitably mounted in bearings 285 and projects rearwardly and has a crank portion 284a on its rear end, whereby the driver by rotating the crank portion 284a and moving the link 284 forwardly or backwardly can select any one of the three speeds and reverse of a conventional gear shift mechanism.

Suitable foot rests 286 and 287 are provided for the feet of the driver to rest upon, or his feet can hang downwardly, if he desires.

The axle housing 188 and 189 has associated therewith suitable braking mechanism, and mounted on the axles themselves are conventional brake drums 288 and 289. The brake mechanisms have conventional cam operating shafts extending inwardly therefrom, to which are secured downwardly extending levers 290 and 291. These are joined by a link 292, so that the driver can press the link 292 forwardly to apply the brakes, as desired.

In order to carry the plurality of tobacco sticks 271 there are provided on each side of the rear portion of the framework of the machine suitable containers or cans 293 and 294, so that when a tobacco stick is filled on the platform 270, the operator can seize same and deposit it onto the platform 150 on one side of the seat or the other. These tobacco sticks 271 in cans 293 and 294 are within reach of the driver, so that he can place another tobacco stick in the position, shown in Figure 10, and can then reach forward and seize the free end of the tape 266 and pull accumulated leaves and tape rearwardly on the stick until it reaches the position, shown in Figure 10, at which time he can sever the tape by use of knife 275 and deposit the filled stick on one of the platforms. These platforms are usually wide enough so that the butts of the leaves can be placed towards each other, there being two sticks of tobacco in each layer on each platform 150 with butts adjacent each other or slightly overlapped as desired.

In order to properly position the tobacco leaves 267, there is provided immediately above the tape 266 and midway between its side edges a longitudinal extending strip 268 against which the butts of the tobacco leaves 267 can be projected by the operators so as to facilitate the placing of the tobacco leaves with the butt ends of their stems on the tape 266. This dividing member 268 is supported at its front end by being attached to the throat member 265.

In the drawings and specifications, there has been set forth a preferred embodiment of the invention, and although specific terms are employed, they are used in a generic and descriptive sense only, and not for purposes of limitation, the scope of the invention being defined in the claims.

I claim:

1. Tobacco harvesting apparatus comprising a wheeled framework, having two front wheels and two rear wheels and having an unobstructed passageway extending longitudinally thereof and open at the bottom, whereby two wheels on one side can run on one side of a row of tobacco plants, and the wheels on the other side of the frame can run on the other side of the row of tobacco plants, means for seating operators in the framework for removing tobacco leaves from the stalks of tobacco disposed between the two side portions of the framework, a pair of conveyers onto which the tobacco leaves are adapted to be placed with their butt ends adjacent each other but not overlapping each other, a tape onto which the butt ends of the tobacco leaves are adapted to be placed, the conveyers serving to

convey the tobacco leaves with the tape rearwardly, a pair of sewing machine needles for forming a line of looped stitches through the butts of the two rows of tobacco leaves and through the tape on which they rest, means disposed rearwardly of the needles and onto which the tape with the tobacco leaves sewed thereon is adapted to be directed, means for severing the tape into proper lengths to cause a severed length to fit onto a tobacco stick of a given length, supporting means carried by the frame for removably supporting a truck and the like and onto which the sticks of tobacco leaves are adapted to be deposited, and means for lowering the truck supporting means so that the truck and the like can rest on the ground and be pulled therefrom.

2. In a tobacco harvesting machine comprising a pair of spaced frameworks secured together at their top portions and having wheels in their lower portions for traversing a field on both sides of a row of tobacco plants, means within each framework for seating a plurality of operators for stripping tobacco leaves from the row of plants between the two frames, means for propelling the two frames along and astride the row of tobacco plants, a pair of conveyers disposed on the top of the two frames and onto which tobacco leaves are adapted to be deposited with their butt ends contiguous to but not overlapping each other, a tape disposed between the conveyers and onto which the butt ends of the tobacco leaves are adapted to be placed, a pair of sewing machine needles adapted to pierce the butt ends of the tobacco leaves and tape, and looping mechanisms associated with the sewing machine needles for forming a continuous row of loop stitches in the tape and through the butt ends of the tobacco leaves, said tape with the tobacco leaves thereon being adapted to be moved by the sewing machine rearwardly of the harvesting apparatus, means for supporting a tobacco stick and onto which the tape with the tobacco leaves is adapted to be deposited, means carried on each side of the frame for releasably supporting a hand truck, and onto which the sticks of the tobacco with the tobacco leaves and tape thereon are adapted to be deposited, means for lowering the trucks onto the ground and from whence they can be pulled to any desired location.

3. In a tobacco harvesting machine comprising a pair of spaced frameworks secured together at their top portions and having wheels in their lower portions for traversing a field on both sides of a row of tobacco, means within each framework for seating a plurality of operators for stripping tobacco leaves from the row of stalks between the two frames, means for propelling the two frames along and astride the row of tobacco, a pair of conveyers disposed on the top of the two frames and onto which tobacco leaves are adapted to be deposited with their butt ends contiguous to but not overlapping each other, a tape carried between the conveyers and onto which the butt ends of the tobacco leaves are adapted to be placed, a pair of sewing machine needles adapted to pierce the butt ends of the tobacco leaves and the tape and looping mechanisms associated with the sewing machine needles for forming a continuous row of looped stitches in the tape and through the butt end of both rows of the tobacco leaves, said tape with the tobacco leaves thereon being adapted to be moved rearwardly of the harvesting apparatus, means for supporting a tobacco stick and onto which the tape with the tobacco leaves is adapted to be deposited, means on each side of the frame for releasably supporting a hand truck, and onto which the sticks of tobacco with the tobacco leaves and tape thereon are adapted to be deposited, means for lowering the trucks onto the ground and from whence they can be pulled to any desired location, said conveying means having markings thereon indicating spaces onto which no tobacco leaves are to be deposited, so that the tape can be severed between the spaces to which the tobacco leaves are sewed, and stop motion means adapted to engage the conveying means when no tobacco leaves are present on the conveying means for automatically stopping movement of the conveying means.

4. Tobacco harvesting apparatus comprising a framework having a space extending longitudinally thereof so that it can be directed along and above and on each side of a row of tobacco plants, driving means for propelling the frame along the row of tobacco plants, means on the frame for supporting an operator on each side of the row of tobacco plants for stripping leaves of tobacco from the tobacco plants, a plurality of conveying means and onto which the tobacco leaves are adapted to be placed with their butt ends in proximity to but not overlapping each other, a tape onto which the butt ends of the tobacco leaves are adapted to be placed, a pair of looping mechanisms for forming a line of looped stitches through the tape and through the tobacco leaves as they are conveyed rearwardly by the conveying means, means on the conveying means indicating spaces where no tobacco leaves are to be deposited, so as to provide spaces between continuous lengths of tobacco leaves sewed to the tape, severing means for severing the tape in the spaces where no tobacco leaves are secured thereto, means for supporting a tobacco stick rearwardly of the looping mechanisms and onto which the tape with the tobacco leaves are adapted to be placed, and means carried by the frame and onto which the tobacco sticks full of tobacco leaves are adapted to be stacked as the framework is propelled along the tobacco rows.

5. In a tobacco stringing apparatus, the combination of a pair of flush top conveyer belts for supporting transversely disposed bunches of tobacco leaves with the butt ends of the tobacco leaves being disposed in close proximity to but spaced from each other and not in overlapping relation, a pair of sewing means for forming two straight chain stitch lines of stitches between the conveyer belts, a tape disposed between the conveyer belts and passed through the sewing mechanisms onto which the tobacco leaves are sewn by the two sewing means, means for advancing the belts with the tobacco leaves thereon in timed relation to the operation of the two sewing means, means for supporting a tobacco stick and onto which the tape is adapted to be deposited, and means for severing the tape when a length sufficient to fill a tobacco stick has had the two rows of leaves secured thereto.

6. In a tobacco stringing apparatus, the combination of a power driven wheeled framework constructed for straddling a row of tobacco plants, means on the framework for supporting a plurality of operators for picking tobacco leaves from the tobacco plants as the apparatus advances along a row of tobacco plants, a pair of spaced flush top conveyer belts and onto which the tobacco leaves are adapted to be deposited

by the operators, after being stripped from the tobacco plants, a tape disposed between the conveyer belts, a pair of laterally spaced sewing mechanisms for forming straight lines of looped stitches in the form of strings through the tape and through the tobacco leaves, means for advancing the conveyer belt in timed relation to the operation of the sewing mechanisms, means for supporting a tobacco stick and onto which the tape with the tobacco leaves sewed thereto is adapted to be deposited, means for severing the tape when a length of tape with tobacco leaves thereon has been formed sufficient to fill the length of the tobacco stick, vertically movable supporting means carried by the rear end of the frame and having trucks thereon and onto which the tobacco sticks with the tobacco and tapes thereon may be deposited, and means for lowering the supporting means so that the trucks onto which the tobacco sticks filled with leaves are deposited, can be removed for transport to other places.

7. In a tobacco stringing apparatus, the combination of means for conveying a tape through two sewing and looping means, conveying means onto which two rows of parallel tobacco leaves are adapted to be placed with the butt portions of the tobacco leaves being adjacent to each other but not in overlapping relation, means for moving the conveying means in timed relation to the sewing and looping means to form two lines of stitches through the two rows of tobacco leaves and through the tape on which the butts of the tobacco leaves rest, and means for severing the tape at intervals so that a length of tape with the tobacco leaves sewed thereto can be deposited on a tobacco stick.

8. Apparatus for securing two rows of tobacco leaves together and for placing the tobacco leaves astride a tobacco stick, comprising means for supporting two rows of parallel leaves in a horizontal plane with the butts of the leaves of one row being adjacent but spaced from the butts of the leaves in the other row, a tape disposed below the butt ends of the two rows, means for forming two lines of looped stitches, each line passing through the butts of the leaves in one row and the other line of stitches passing through the butts of the leaves in the other row, and through the tape to thereby connect the butts of the tobacco leaves to the tape, means for supporting a tobacco stick and onto which the tape with the tobacco leaves thereto is adapted to be guided, and means for severing the tape when a length of tape has had tobacco leaves stitched thereto sufficient to fill the stick.

HARVEY L. WHITLEY.

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Dec. 12, 1950 J. M. JONES 2,533,813

TOBACCO ELEVATOR

Filed May 27, 1948 2 Sheets-Sheet 1

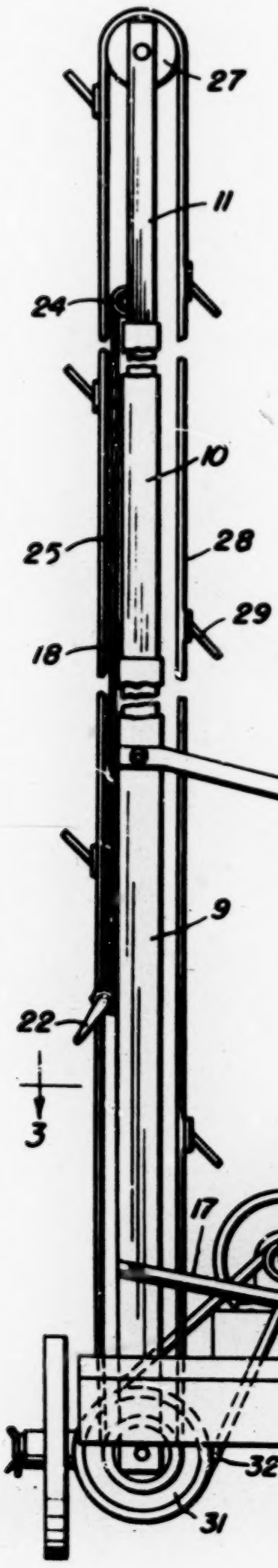


Fig. 1.

Fig. 3.

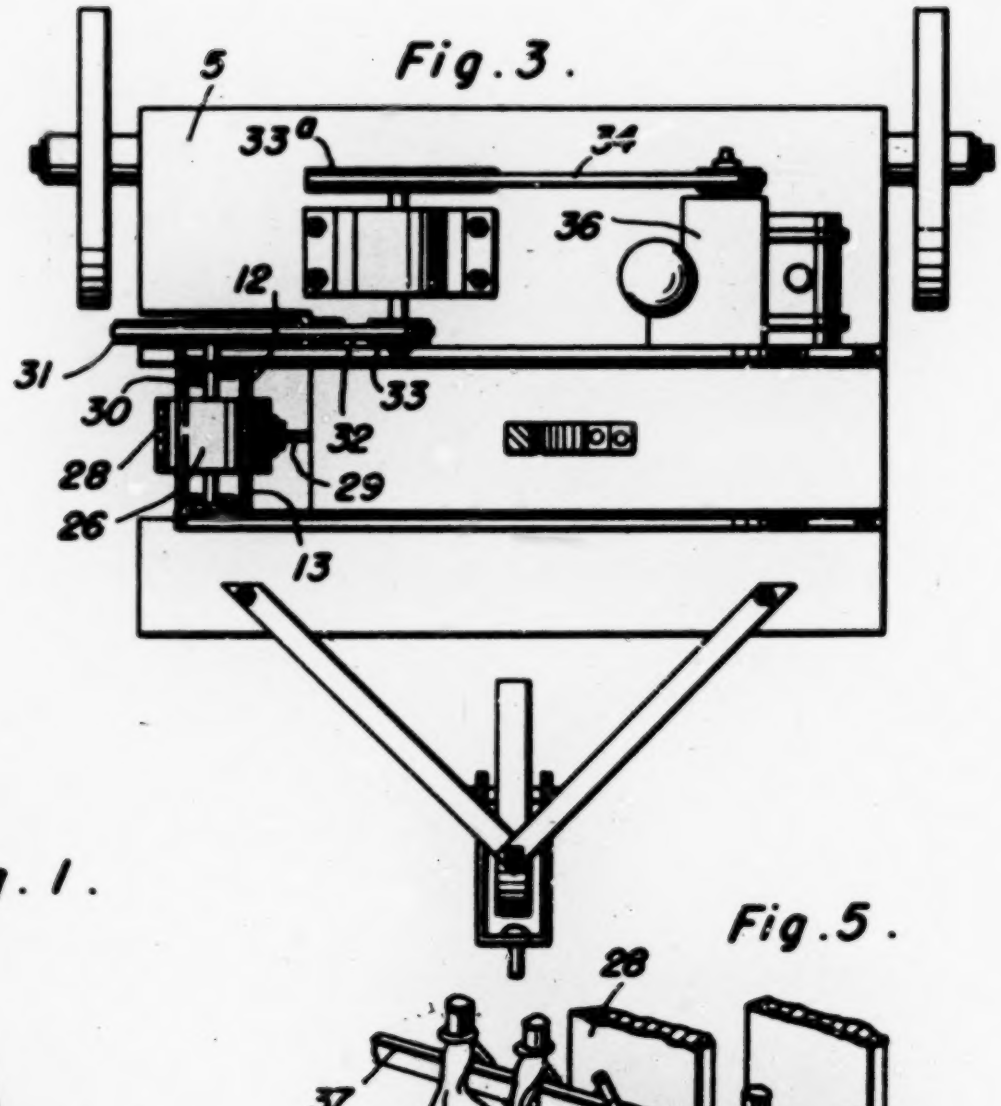
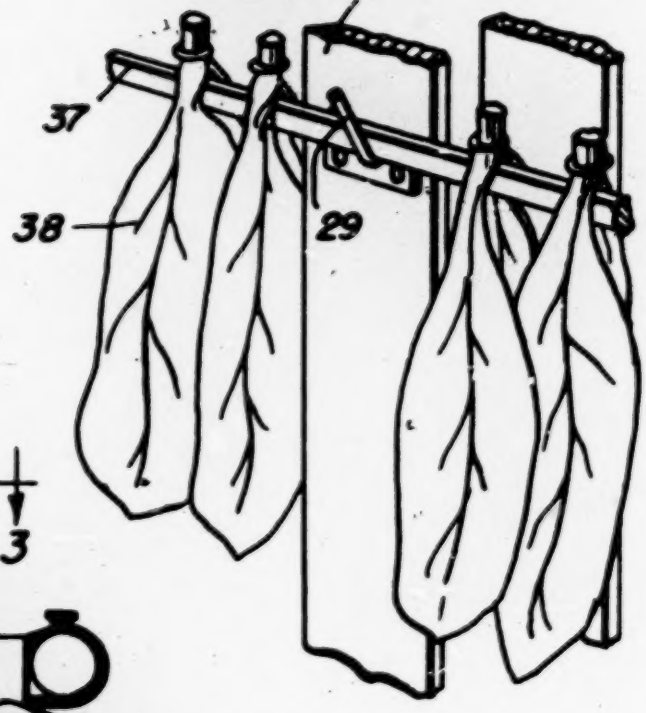


Fig. 5.



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Dec. 12, 1950 J. M. JONES 2,533,813

TOBACCO ELEVATOR

Filed May 27, 1948 2 Sheets-Sheet 2

Fig. 2.

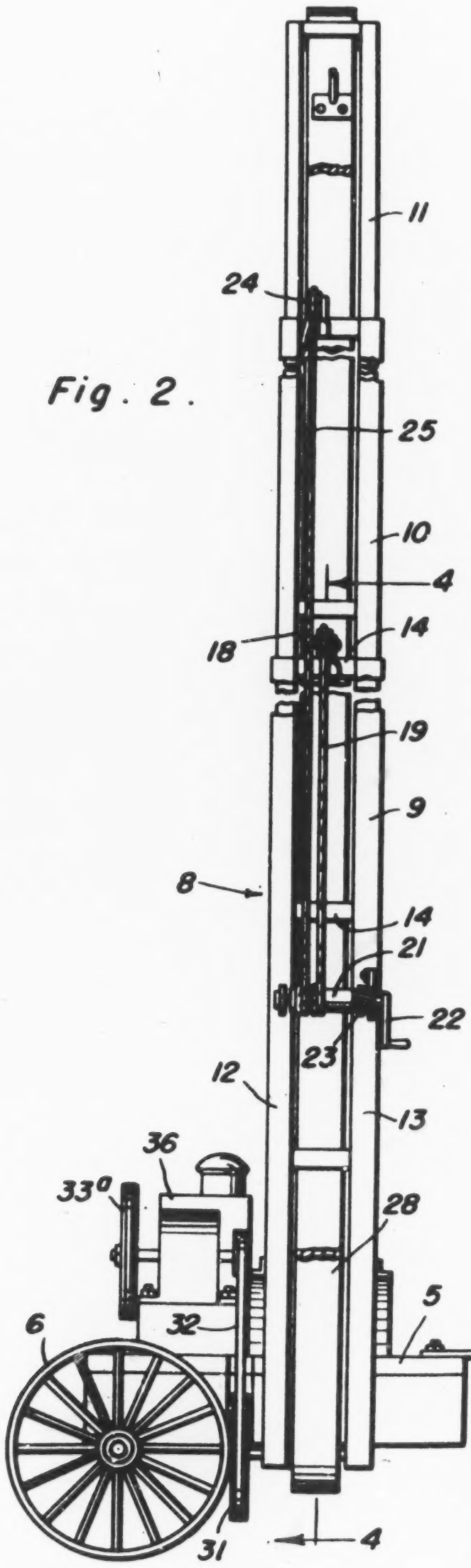
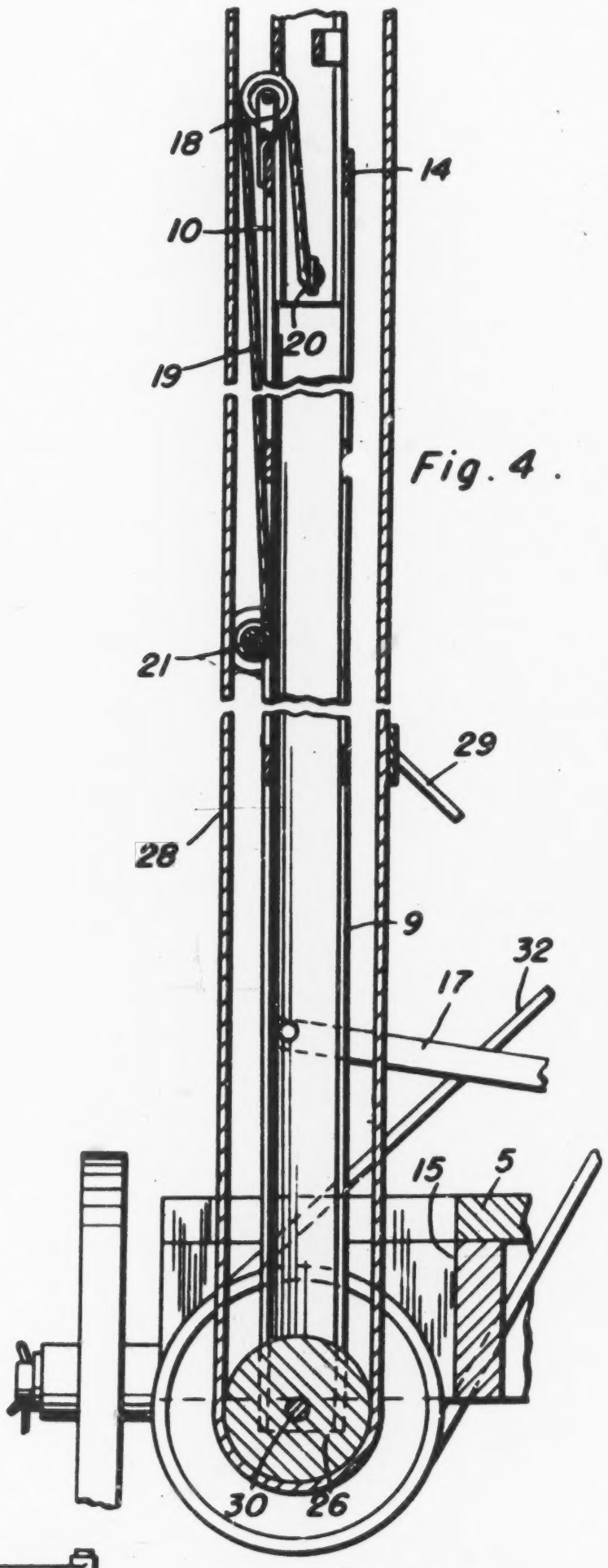


Fig. 4.



Joseph M. Jones
INVENTOR.

BY Adams & O'Brien and Harvey B. Jacobson
Attorneys

Patented Dec. 12, 1950 2,533,813

UNITED STATES PATENT OFFICE

2,533,813

TOBACCO ELEVATOR

Joseph M. Jones, Lexington, Ky.

Application May 27, 1948, Serial No. 29,599

2 Claims. (Cl. 198—139)

1

The present invention relates to new and useful improvements in tobacco elevators for hoisting tobacco from a wagon or truck into a barn.

An important object of the invention is to provide a portable elevator for movement into a desired elevating position in a barn and including a power operated endless conveyor having hooks on which tobacco sticks are placed for carrying the tobacco upwardly in the barn.

A still further object is to provide a portable power operated elevator including a collapsible mast to facilitate its movement into and out of position in a barn.

A still further object is to provide an apparatus of this character of simple and practical construction, which is efficient and reliable in operation, relatively inexpensive to manufacture and otherwise well adapted for the purposes for which the same is intended.

Other objects and advantages reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a front elevational view;

Figure 2 is a side elevational view with parts broken away and shown in sections;

Figure 3 is a horizontal sectional view taken substantially on a line 3—3 of Figure 1;

Figure 4 is an enlarged fragmentary vertical sectional view of the mast taken substantially on a line 4—4 of Figure 2; and

Figure 5 is an enlarged fragmentary perspective view of the endless conveyor showing one of the tobacco sticks supported thereon.

Referring now to the drawings in detail wherein for the purpose of illustration I have disclosed a preferred embodiment of the invention the numeral 5 designates a platform supported at its rear end by a pair of wheels 6 and supported at its front end by a swivelly mounted wheel 7 to facilitate the guiding of the platform into a desired working position.

A mast designated generally at 8 rises from one side of the platform 5, the mast including a lower section 9, an intermediate section 10 and an upper section 11 having telescopic movement one within the other. Each mast section includes opposed channel members 12 and 13 having their opposed edges spaced from each other and rigidly connected together by cross bars 14. The lower end of the lower mast section 9 extends downwardly through an opening 15 in one side of the platform and is suitably secured to

2

the platform. Upper and lower braces 16 and 17 extend from the side portions of the lower section 9 to the platform to hold the mast upright.

A pulley 18 is journaled to the uppermost cross bar of the lower section 9 over which a cable 19 is trained with its upper end attached to an eye 20 at one side of the lower end of the intermediate section 10, the lower end of the cable being attached to a winch 21 mounted on the lower portion of the lower section 9 and operated by a crank handle 22. The winch is also provided with a conventional type of pawl and ratchet 23 for holding the winch against unwinding movement.

A pulley 24 is likewise journaled to the uppermost cross bar of the intermediate section 10 and over which a cable 25 is trained with its upper end attached to the lower end of the upper section 11 and its lower end also attached to the winch 21 for winding thereon. The operation of winch 21 simultaneously raises and lowers the intermediate section 10 and upper section 11 of the mast whereby both of said sections may telescope into the lower section 9 into a collapsed position.

A roller 26 is journaled between the channel members 12 and 13 of the lower section 9 at the lower end thereof and an upper roller 27 is likewise journaled between the channel members of the upper mast section 11 and on which an endless belt 28 travels for vertical movement. Hooks 29 are secured in vertically spaced apart relation on the outer surface of belt 28, the hooks comprising inclined rods which extend upwardly on the upwardly traveling flight of the belt on the outerside of the mast.

The lower roller 26 is secured to a shaft 30 journaled transversely of mast section 9 and having a pulley 31 secured to one end thereof and driven by a belt 32 from reduced pulleys 33 and 33a driven by a belt 34 from a pulley 35 of an internal combustion engine or other suitable power plant 36 mounted on platform 5.

In the operation of the device the mast 8 is raised to its fully extended position and conveyor belt 28 driven by the engine 36. Tobacco sticks 37 supporting bundles of tobacco 38 are placed on the upwardly traveling hooks 29 from a truck or wagon at the lower end of mast 8 to raise the tobacco into an elevated position in a barn where the sticks are removed by workmen in the top of the barn for storing therein.

In view of the foregoing description taken in conjunction with the accompanying drawings it

is believed that a clear understanding of the device will be quite apparent to those skilled in this art. A more detailed description is accordingly deemed unnecessary.

It is to be understood, however, that even though there is herein shown and described a preferred embodiment of the invention the same is susceptible to certain changes fully comprehended by the spirit of the invention as herein described and the scope of the appended claims.

Having described the invention, what is claimed as new is:

1. An elevator comprising a portable platform, an extensible mast including a fixed section on said platform, a first vertically adjustable section slidable out of said fixed section, and a second vertically adjustable section slidable out of said first section, an endless flexible conveyor carried by said fixed and second sections conjointly for tightening by sliding of said first and second sections outwardly, and crank operated means common to said first and second sections for sliding said first section out of said fixed section and said second section out of said first section simultaneously.

2. An elevator comprising a portable platform,

an extensible mast including a fixed section on said platform, a first vertically adjustable section slidable out of said fixed section, a second vertically adjustable section slidable out of said first section, an endless flexible conveyor carried by said fixed and second sections conjointly for tightening by sliding of said first and second sections outwardly, and crank operated wind-up cable means common to said first and second sections for sliding said first section out of said fixed section and said second section out of said first section simultaneously.

JOSEPH M. JONES.

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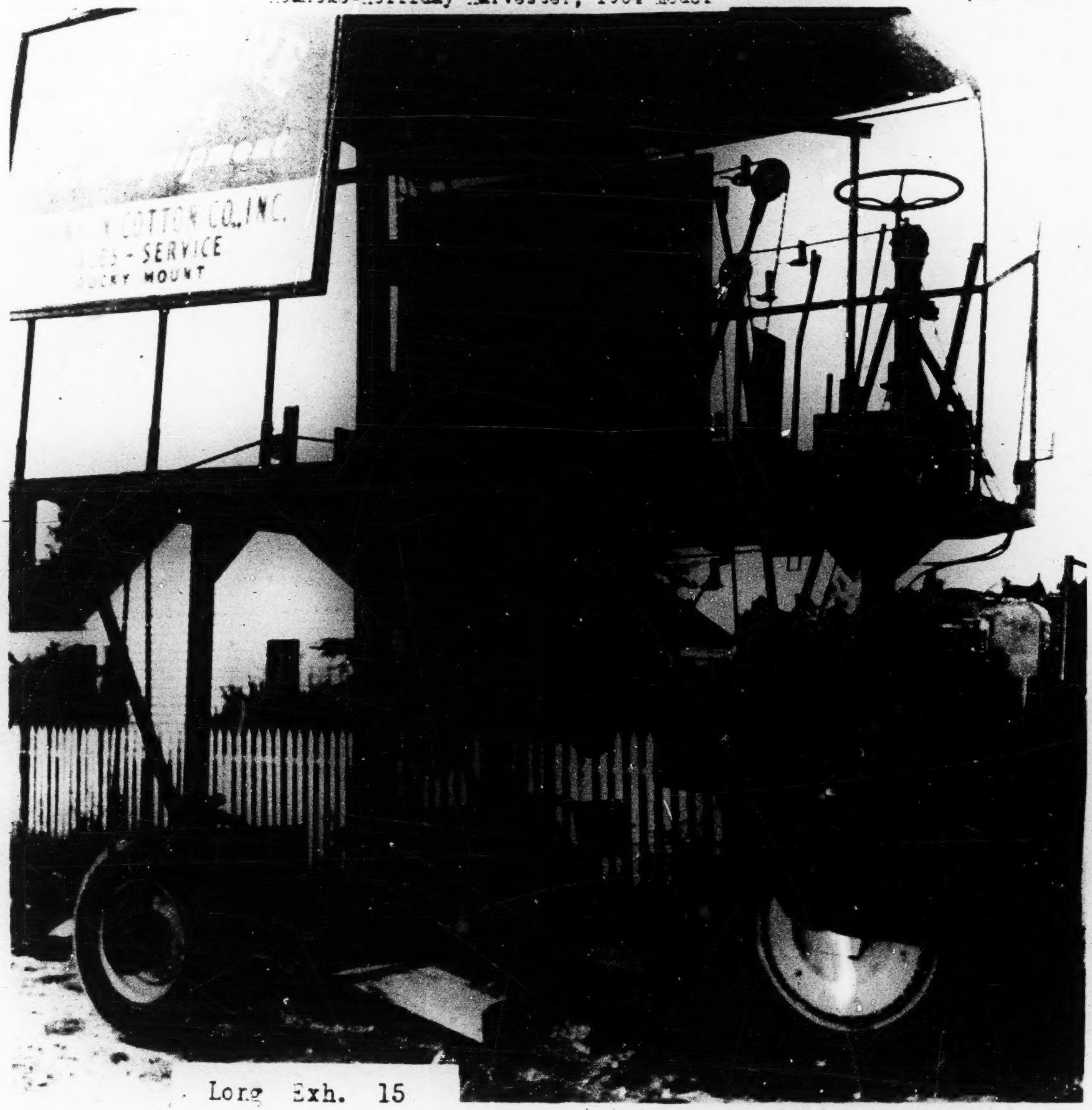

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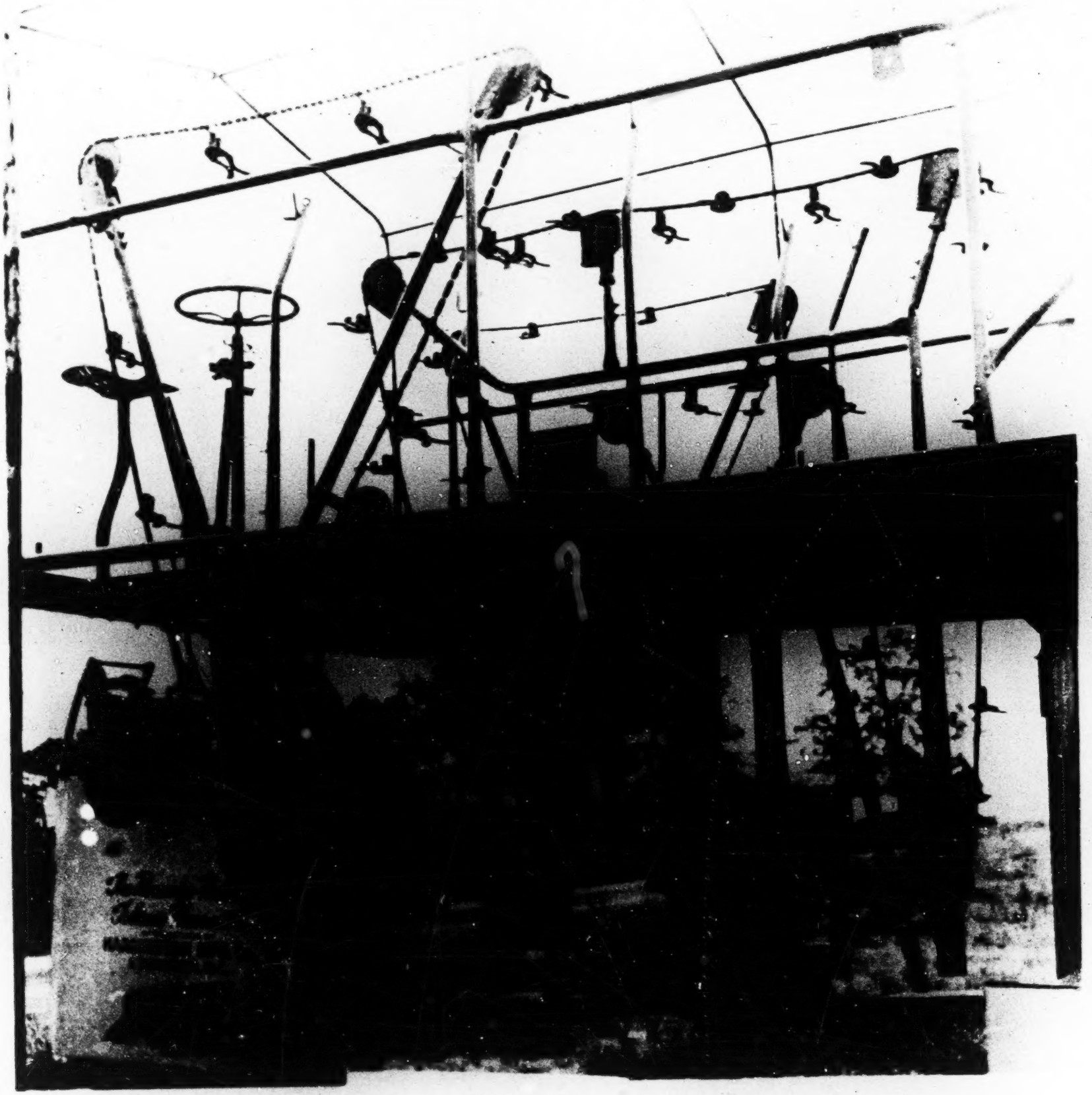

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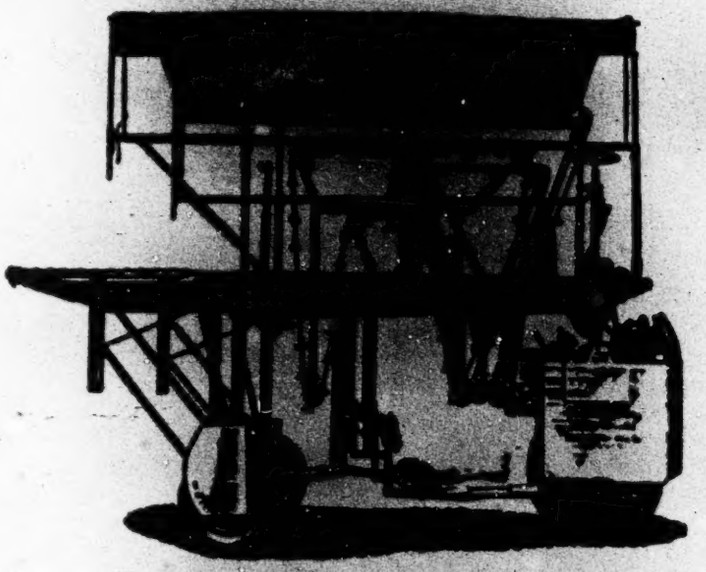

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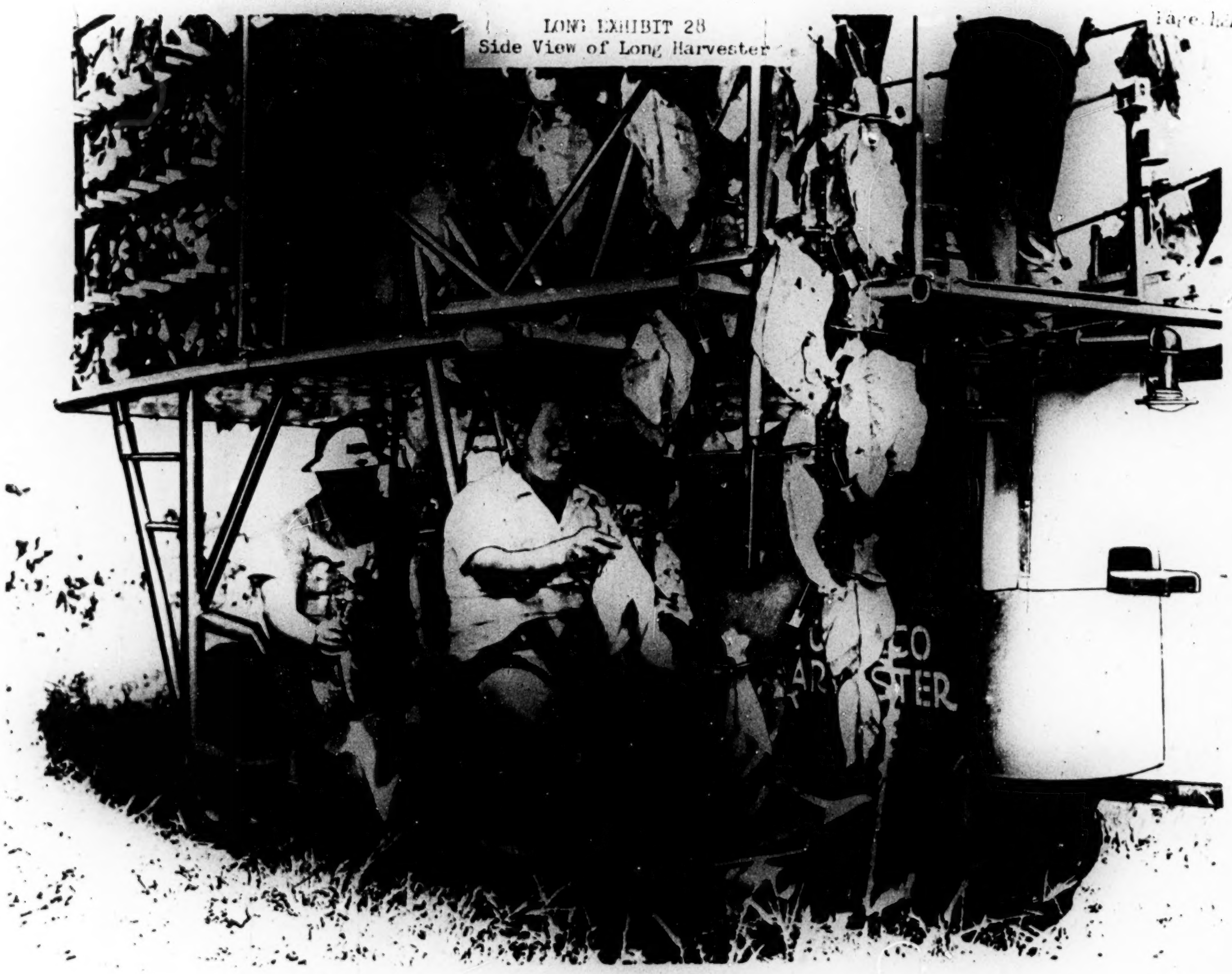
MONDAY MORNING, JULY 4, 1955

LONG EXH. 24

LONG EXHIBIT 28
Side View of Long Harvester



FILED
DEC 9 1957
JOHN T. FEY, Clerk

IN THE

Supreme Court of the United States

OCTOBER TERM, 1957

No. 654

JIM BROWN HOLLIDAY and HARRINGTON MANUFACTURING COMPANY, INC., *Petitioners*

v.

LONG MANUFACTURING COMPANY, INC., LONG TOBACCO HARVESTING COMPANY, INC., and WILLIAM R. LONG, *Respondents*

PETITION FOR WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FOURTH CIRCUIT

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PETITION FOR WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FOURTH CIRCUIT

Jim Brown Holliday and Harrington Manufacturing Company, Inc. (plaintiffs-appellees below), petition this Court for a writ of certiorari to review the judgment of the United States Court of Appeals for the Fourth Circuit in the matter here involved.

OPINIONS BELOW

The District Court opinion is reported at 146 F. Supp. 527 (111 U.S.P.Q. 436). The Court of Appeals opinion is reported at 246 F. 2d 95 (114 U.S.P.Q. 4). Copies of the opinion are appended hereto.

JURISDICTION

The decree of the Fourth Circuit Court of Appeals was both dated and entered on May 27, 1957.

The time for filing a petition for rehearing was, on June 21, 1957, extended twenty days beyond June 26, 1957.

A petition for rehearing was filed on July 13, 1957, and order denying rehearing was both filed and entered on September 13, 1957.

The jurisdiction of this Court is invoked under 28 U.S.C. Sec. 1254(1).

QUESTION PRESENTED FOR REVIEW

This is a patent infringement action involving a tobacco harvester. The District Court, with an earthy, practical Judge who knew the people, the problem, and the history, and understood tobacco farming and harvesting (and the aching backs that result from it) spent many days on this lawsuit, heard numerous witnesses, went and looked at the machines involved, and finally determined that the patent was a pioneer patent, and was valid, and was infringed. In this, his judgment agreed with that of the United States Patent Office both as to the patentability of the device, and more specifically as to the construction of the single claim here involved. This construction turned on one word, "vertical", which both the District Judge and the United States Patent Office construed with reasonable liberality, basing this construction upon the facts of the case. There was much testimony about what this word meant and why.

The Court of Appeals on an abbreviated record, which its rules and practice effectively urge upon the

appellants in place of a full record, and after a half hour argument, much of it consumed by questions by the Judges, brushed aside the District Court's findings as to infringement, wrote an opinion that shows a lack of understanding of the facts of the case, and ended by construing "vertical" so absolutely literally as to make the important patent here in suit entirely valueless.

The question involved is whether or not this Court of Appeals is to be permitted to ignore well-supported findings of fact of the District Court despite FRCP 52(a). If it is, we might as well take depositions of witnesses and submit cases directly to the Court of Appeals. The District Court will have lost its purpose. Furthermore, the construction placed on the instant patent claim by the Court of Appeals is so ridiculously narrow as to amount to a nullification of the protection which a patent is supposed to afford.

FEDERAL RULES OF CIVIL PROCEDURE, RULE 52(a)

FINDINGS BY THE COURT

(a) *Effect.* In all actions tried upon the facts without a jury or with an advisory jury, the court shall find the facts specially and state separately its conclusions of law thereon and direct the entry of the appropriate judgment; and in granting or refusing interlocutory injunctions the court shall similarly set forth the findings of fact and conclusions of law which constitute the grounds of its action. Requests for findings are not necessary for purposes of review. Findings of fact shall not be set aside unless clearly erroneous, and due regard shall be given to the opportunity of the trial court to judge of the credibility of the witnesses. The findings of a master, to the extent that the court adopts them, shall be considered as the findings of the court. If an opinion or memorandum of de-

cision is filed, it will be sufficient if the findings of fact and conclusions of law appear therein. Findings of fact and conclusions of law are unnecessary on decisions of motions under Rules 12 or 56 or any other motion except as provided in Rule 41(b). As amended Dec. 27, 1946, eff. March 19, 1948.

* * * * * * * *

STATEMENT OF THE CASE

This litigation began when Jim Brown Holliday and the Harrington Manufacturing Company, Inc., sued the Long Manufacturing Company, Inc., and others for infringement of United States Letters Patent 2,672,248 granted to Holliday for an improvement in tobacco harvesters. Harrington Manufacturing Company, Inc., is Holliday's licensee.

Long Manufacturing Company, Inc., and others countered with a suit against Harrington Manufacturing Company, Inc., and Jim Brown Holliday for infringement of a later issued patent to Long, No. 2,704,158.

The two actions were tried simultaneously. Both patents were held to be *valid* and *infringed* but the District Court Judge pointed out that the Holliday patent was a pioneer patent, whereas the Long patent related to a rather minor improvement. The District Court opinion states the facts quite well and there is no reason to repeat them here.

On concurrent appeals to the Fourth Circuit Court of Appeals, the Court of Appeals reversed the District Court as to infringement of the Holliday patent, holding the patent to be valid but "a narrow combination or paper patent" and entitled to so little scope as to make it completely valueless.

A petition for rehearing was filed as to the holding relative to the Holliday patent but this petition was denied.

The petition for certiorari has been taken from the decision in the *Holliday et al* v. *Long Manufacturing Company, Inc., et al* case (No. 7383 in the Court of Appeals and No. 340 in the District Court) and not from the case relative to the Long patent, (No. 7384 in the Court of Appeals and No. 350 in the District Court). Thus, there will appear in the appended decisions certain references to the Long patent 2,704,158 and the infringement of that patent by the machine manufactured by the Harrington Manufacturing Company, Inc., which references have no pertinence here. We are here concerned only with the scope accorded to the Holliday patent.

The District Court found that the Holliday invention was pioneer in nature and that claim 7 was entitled to a liberal construction and that the Long machine embodied the fundamentals of the Holliday machine as defined in claim 7. This finding was based on the testimony of a number of witnesses relative to the history of tobacco harvesting and the benefits that accrued and might reasonably be expected to accrue from the use of the Holliday machine. It was also based on the Patent Office record of the application for the Long patent, in which the Patent Office indicated that it did not consider the word "vertical" to be a material limitation in claim 7 of the Holliday patent (Joint Appendix below 11a). It was also based on the somewhat conflicting testimony of two patent experts, one of whom clearly testified that the word was entitled to the broader interpretation. It was also based on the District Court's correct understanding of

the fact that Jim Brown Holliday built and tested a machine that embodied the fundamental concept more than a year prior to the time that Long built a machine, and petitioners believe that the District Court took into consideration the fact that Long and Holliday lived in the same part of North Carolina and that Long was in the business of manufacturing agricultural machines, and that it would be likely that Long would either directly or indirectly know of Holliday's work.

The Court of Appeals, without seeing or hearing witnesses and without properly understanding the facts, brushed all this aside and held the Holliday patent to be a "narrow combination or paper patent" and limited so strictly as to be valueless, merely because Long was the first to commercialize the device, and probably partly because Harrington Manufacturing Co. (not the inventor Holliday who will suffer most by the Court of Appeals decision) copied certain minor features from Long. The Court of Appeals was plainly wrong as to several important facts as will appear.

(a) Findings of Fact of District Court Reversed by Court of Appeals

At this point this Court's attention is directed to what was found to be facts by the District Court and the position taken by the Court of Appeals in brushing aside the findings of the District Court. The District Court found that in claim 7 the word "vertical" was a random adjective chosen to describe the then existing form of the Holliday invention, and that Hollday's history in the Patent Office indicated that he was under no compulsion to word his claim as was done. (Appendix this Petition 8a). The Court of Appeals in holding that claim 7 was not infringed by Long held

that the word "vertical" could not be construed as a random adjective (Appendix this Petition 21a) and that Holliday was compelled to word his claim as was done in the Patent Office (Appendix this Petition 22a).

The District Court in determining that claim 7 of the Holliday patent was infringed found that in the Long machine the pertinent frame members and pertinent stretches of the conveyor chains, while not truly vertical, were substantially vertical (Appendix this Petition 7a). The District Court further found that any variations as between the Long machine and the machine illustrated in the Holliday patent were of no consequence insofar as functional purposes were concerned (Appendix this Petition 10a). The Court of Appeals in holding that the Long machine did not infringe claim 7 of the Holliday patent took the position that the conveyor system of Long was substantially different in design and arrangement from that defined by claim 7 of the Holliday patent (Appendix this Petition 24a.

The District Court found that the most recent model of the Long machine had long stretches of *vertical* chains and also *vertical* seat supports (Appendix this Petition 11a). The Court of Appeals paid no attention whatsoever to any form of the Long machine, except the machine shown in the Long patent; yet the record shows three different forms of the Long machine (Joint Appendix below 6a, 21a, 42a).

The District Court found that the Holliday invention was a pioneer invention entitled to a broad range of equivalents (Appendix this Petition 6a), that the Holliday patent was not limited to coverage of replicas of his original embodiment of the invention, that form

was not the essence of the Holliday invention (Appendix this Petition 8a) and that the Long Construction was the equivalent of the machine illustrated in the Holliday patent (Appendix this Petition 10a). The Court of Appeals held that the Holliday invention was not a pioneer invention (Appendix this Petition 22a), that the Holliday patent was a narrow combination or paper patent, and that Long's machine was not the equivalent of the construction defined by claim 7 of the Holliday patent (Appendix this Petition 24a).

Further, the District Court made no finding to the effect that Long knew nothing of the Holliday machine before he developed his invention, and the District Court made no finding that Holliday copied the Long machine. However, the Court of Appeals held that Long knew nothing about Holliday's work and apparently took nothing from Holliday, and the Court of Appeals styled Holliday as the copyist and Long as the effective innovator (Appendix this Petition 25a). These findings by the Appellate Court apparently were based on the observation of the Appellate Court that Long's machine was tested in the field "10 days *after* Holliday's first test of his machine" (Appendix this Petition 20a—Emphasis ours) and the Appellate Court's erroneous conclusion that Holliday learned of the Long machine prior to its public demonstration in September, 1953, due to the fact that Holliday had talked with Davis, Long's Chief Engineer, and obtained pictures of the Long machine from him. However, the District Court found that in 1952, more than a year before Long tested his machine in the field (and at least a year before Long began to construct any type of tobacco harvester), Holliday actually constructed and tested a tobacco harvester like the patented machine except that the conveyor chains in the 1952 harvester

were manually operated (Appendix this Petition 3a). Further, the record shows plainly that Holliday *did not* talk with Davis, the chief engineer of Long, until *after* the public demonstration of the Long machine in September, 1953 (Joint Appendix below 30, 38).

BASIS OF FEDERAL JURISDICTION IN FIRST INSTANCE

This is a patent infringement action, originally brought in the District Court for the Eastern District of North Carolina, Washington Division, where the defendants are domiciled and where the alleged infringement was and is occurring. Jurisdiction and venue are in accordance with 28 U.S.C. 1338(a), 1400(b).

ARGUMENT AMPLIFYING REASONS FOR ALLOWANCE OF WRIT

The Court of Appeals Was Clearly Wrong and in Direct Conflict with the Applicable Decisions of This Court and F.R.C.P. 52(a) in Reversing the Fact Finding of the District Court, Based on Substantial Evidence, that the Holliday Patent Was for A Pioneer Invention.

The District Court's finding that the Holliday patent related to a pioneer invention was based on the testimony of Jim Brown Holliday and William R. Long, the newspaper reactions to the first successful operation of the Holliday tobacco harvester, the obvious lack of success of prior tobacco harvesters, a direct viewing of the tobacco harvesters involved by the District Court Judge, and probably to some extent, which we shall never be able to determine, upon the knowledge of the Judge himself, since he is a native of the tobacco country and knew the problems of tobacco harvesting firsthand.

With all this background and all this specific testimony, the District Judge was peculiarly well qualified

to make the decision as to whether or not the Holliday contribution was in fact a pioneer invention. Certainly, Jim Brown Holliday testified that it was, certainly the Patent Office granted the patent on it, certainly the newspapers gave it considerable favorable publicity at the time of its first successful operation, and in view of these facts the Court of Appeals could not possibly, within the bounds prescribed by F.R.C.P. 52(a) have reversed this fact finding. To do so was to substitute uninformed judgment for informed judgment and to make the Court of Appeals a super tryer of facts rather than a Court of legal review.

The Court of Appeals Was Clearly Wrong and in Direct Conflict with the Applicable Decisions of This Court and F.R.C.P. 52(a) in Reversing the Fact Finding of the District Court, Based on Substantial Evidence, that the Word "Vertical" Was Used in the Holliday Patent Claim 7 as "A random Adjective Chosen to Describe the Then Existing Form of Tobacco Harvester". Similarly, the Court of Appeals Was Clearly Wrong in Overruling the Finding of the District Court that "Form Is Not the Essence of Holliday's Invention."

The District Court, in finding that the term "vertical" was "a random adjective chosen to describe the then existing form of the tobacco harvester" and in finding that "Form is not the essence of Holliday's invention", did so as a matter of fact and upon evidence from the Patent Office records showing clearly that the Patent Office did not consider the word "vertical" to be a vital limitation and upon the testimony of Jim Brown Holliday as to what he considered his invention to be, and upon the testimony of Walter Roe, a former patent examiner of long experience who testified as to the proper meaning to be attributed to the word "vertical", and as to the fact that form was not the essence of the invention of the Holliday patent.

The District Court also had before it the testimony of William R. Long, one of the defendants, to the effect that the Holliday device and the Long device accomplished much the same purpose in much the same way and had many of the same components arranged in many respects alike. The District Court further had before it the testimony of defendants' expert, W. W. Cochran, who attempted to testify that the word "vertical" should be construed very strictly and that the specific form of Holliday's invention was the essence of his patent.

With this conflicting testimony, the District Court having seen and heard the witnesses, determined that form was not the essence of Holliday's invention and that the word "vertical" should not be strictly and literally construed. Furthermore, the District Court determined that for all intents and purposes the Long construction was fully equivalent to the Holliday construction. Reversal of this fact finding is again clearly beyond the proper function of the Court of Appeals.

The Fourth Circuit Court of Appeals Has Shown A Rather Pronounced Tendency to Disregard F.R.C.P. 52(a)

The practice of the Fourth Circuit Court of Appeals is to have only the necessary parts of the record printed and these printed as appendices to the brief. The Court is known to have a distaste for unnecessarily lengthy appendices, and hence counsel quite reasonably printed sufficient of the testimony in the District Court to suport the District Judge's findings, but omitted a great deal of cumulative evidence, and pointed out Rule 52(a) to the Court.

Once counsel for petitioners recovered from the shock of the Court of Appeals' decision, they began to

look around at the other recent decisions of this same Court of Appeals, and they almost immediately noted some interesting facts. In several other recent cases, among them the case of *Rohm & Haas Company* v. *Roberts Chemicals, Incorporated* (D.C. dec. 142 F. Supp. 499, C.A. dec. 245 F. 2d 693) and in the case of *Sears Roebuck and Company* v. *Minnesota Mining Company* (D.C. dec. 141 F. Supp. 686, C.A. dec. 243 F. 2d 136), this same Court also reversed the lower court by brushing aside the findings of fact of the lower court with apparently very little consideration being given to the fact that the lower court had before it the witnesses and a more complete record.

This caused counsel to wonder if the Fourth Circuit Court of Appeals really had a proper appreciation of F.R.C.P. 52(a) and accordingly counsel made a search through the last ten years of decisions in the Federal Rules Decisions to find out how often the Fourth Circuit Court of Appeals had cited Rule 52(a). It turned out that the average number of times that Rule 52(a) had been cited in all circuits, including the District of Columbia circuit, was 44 times per circuit in the ten years. In the Fourth Circuit Court of Appeals it was cited only 17 times and of these 17 times, 5 times were citations by the District Courts.

Counsel appreciates that this is far from conclusive as an indication that the Fourth Circuit Court of Appeals does not have a proper appreciation of Rule 52(a) and appreciates that they cannot in this petition argue the *Rohm and Haas* or *Minnesota Mining* cases. They earnestly believe, however, that a reading of the decisions in these other cases, and a reading of the decisions in the present case will show what is attempted to be emphasized here. In substance, counsel

believes the Fourth Circuit Court of Appeals has so far departed from the accepted and usual course of judicial proceeding as to call for the exercise of the Supreme Court's power of supervision.

This Court has emphasized F.R.C.P. 52(a), and the decision of the Fourth Circuit Court of Appeals is therefore in conflict with such applicable decisions of this Court as: *Graver Tank & Mfg. Co.* v. *Linde Air Products Co.*, 336 U.S. 271, 69 S. Ct. 535, 93 L. Ed. 672 (1950); *Graver Tank & Mfg. Co.* v. *Linde Air Products Co.*, 339 U.S. 605, 70 S. Ct. 854, 94 L. Ed. 1097 (1950).

In the Graver Tank case (there were two decisions by this Court, the second decision relating to a rehearing limited to the matter of infringement and the application of the doctrine of equivalents), the trial Court had held four of the claims valid and infringed, but held other claims involved to be invalid. The Court of Appeals, while affirming the trial court on the claims held to be valid, overruled the trial court on the holding of invalidity. This Court, after citing rule 52(a) and pointing out its peculiar applicability to a patent case, overruled the Court of Appeals insofar as that Court had overruled the findings of the trial Court. It would seem that the corollary to this Court's decision in the Graver Tank case is that when the trial Court finds that *infringement* exists, the Court of Appeals should give due consideration to Rule 52(a) and that the findings of the trial Court should prevail, unless clearly erroneous.

The second decision of this Court in the Graver Tank case (See 339 U.S. 605, 609, 611, 612 70 S. Ct. 854, 855, 858) is apropos to the case at bar. This Court pointed out that a finding of equivalance is a determination

of fact and that it was not the province of this Court to "essay an independent evaluation of this evidence" and went on to point out that, where the trial Court found that the composition of the party charged with infringement and the composition of the patent were "substantially identical in operation and result", "it is difficult to conceive of a case more appropriate for the application of the doctrine of equivalents."

CONCLUSION

For the foregoing reasons, it is respectfully urged that this petition be granted.

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APPENDIX

IN THE DISTRICT COURT OF THE UNITED STATES
THE EASTERN DISTRICT OF NORTH CAROLINA, WASHINGTON DIVISION

CIVIL—NOS. 340 & 350

Civil No. 340

JIM BROWN HOLLIDAY and HARRINGTON MANUFACTURING COMPANY, INCORPORATED,

Plaintiffs,

v.

LONG MANUFACTURING COMPANY, INC.; LONG SUPPLY COMPANY, INC.; LONG TOBACCO HARVESTING COMPANY, INC.; WILLIAM R. LONG; JOHN G. LONG; JAMES O. HALL,

Defendants.

(Civil No. 350)

LONG MANUFACTURING COMPANY, INC.,

Plaintiff,

v.

HARRINGTON MANUFACTURING COMPANY, INC.; J. J. HARRINGTON; C. B. STANFIELD; V. E. FOUNTAIN; ETHEL J. HARRINGTON; JIM BROWN HOLLIDAY,

Defendants.

(Filed November 30, 1956.)

Consolidated Memorandum Opinion

These two actions were consolidated for hearing. Both plaintiffs allege patent infringement and unfair competition in the defendants' production and sale of a tobacco harvesting machine. The same facts are at issue in both cases.

The parties consented at the trial to dismiss the defendants Long Supply Company, Inc.; John G. Long; and James O. Hall from the action brought by Holliday and Harrington Manufacturing Company, Inc. against Long Manufacturing Company, Inc., *et al.* Similarly, C. B. Stanfield, V. E. Fountain, Ethel J. Harrington, and Ethel B. Harrington were dismissed as defendants from the action by Long Manufacturing Company, Inc., against Harrington Manufacturing Company, Inc., *et al.*

Before considering the controversy presented in these consolidated cases, it will be helpful to look generally at the tobacco harvesting problem as it existed prior to 1952, when the first concrete steps toward its solution were taken by the litigant, Jim Brown Holliday.

The bright leaf, flue cured tobacco cultivated in North Carolina, Virginia, and other Southern states is grown from seed in sheltered plant beds. In spring the young plants are reset in regularly spaced rows through the fields. Fully grown plants are about five to seven feet in height. Broad tobacco leaves, from six inches to two feet long, grow directly out of the stalk, beginning a few inches above ground level and continuing at intervals to the top of the stalk.

The leaves do not mature uniformly. The whole plant cannot be harvested at one time. Bottom leaves are the earliest to ripen. Others follow progressively until the tip leaves are reached. Thus a single field may be harvested or primed from three to six times within a single season.

Ripe leaves must be selected by hand. The customary process was for pickers or primers to walk between the rows of tobacco, take the leaves ready for curing and place them in a small wagon or sled. The conveyance filled in this manner is pulled out of the field to a place where "handers" make convenient bundles of the leaves and pass the bundles by hand to "loopers", who attach them with cotton twine about the stems to a stick. The sticks, with

many bundles of tobacco leaves tied to each, are placed on racks to await removal to similar racks in a curing barn.

This traditional system of "barning" tobacco involves direct handling of the leaves by three different groups of workers, to wit, "primers", "handlers", and "loopers". Expenses to the producer resulting from high labor costs and a damaged product were excessive. The labor was arduous and slow.

In 1952, Jim Brown Holliday was farming near Jamesville, North Carolina. With the aid of a machine shop in Williamston, North Carolina, he built a high clearance, tobacco harvesting machine. Like many "firsts", Holliday's first model was a rather crude apparatus. There was a poor tobacco crop that summer. The machine was mainly used for spraying insecticides. However, Holliday's limited trials of his machine as a harvester convinced him that the basic idea was sound.

High clearance machines, in the farm implement art, are devices which roll through a field and pass over the tops of growing plants, leaving them unharmed. Such machines have long been used for such purposes as detasseling corn, spraying, and dusting crops. Never had one been made for independent use in tobacco leaf harvesting. Holliday's idea consisted of mounting on the overhead platform, racks for the tobacco sticks in a convenient location for the looper to tie the leaves as they passed up to him in clips on a conveyor chain from the primer riding beneath the platform in an adjustable seat adjacent to the tobacco and to the lower reach of the conveyor chain. The conveyor chain was hand operated.

Through the fall and winter he worked to improve his harvester. When the 1953 summer harvest season arrived, he was ready with a machine that had power driven conveyor chains. This improved version of Holliday's machine operated in the field on July 3, 1953, and was given some publicity in the nearby Williamston newspaper.

On October 9, 1953, Holliday applied for his patent. March 16, 1954, Patent No. 2,672,248 was issued to him. Meanwhile on March 5, 1954, he entered into a contract with Harrington Manufacturing Company, Inc., whereby Harrington was granted an exclusive license to manufacture harvesters under Holliday's patent. Holliday himself managed sales for Harrington. Roanoke Holliday Tobacco Harvesters appeared on the market for the 1954 harvest season.

W. R. Long, of Tarboro, North Carolina, entered the farm implement business in 1943. For some time prior to 1953 he had entertained the idea of making a tobacco harvesting machine. His first steps toward that end were taken in June of that year when he and his draftsman, W. E. Davis, launched a building program as two different harvesters.

The Davis machine featured an automatic looper or sewing head for which he later obtained a patent (No. 2,715,-968). His machine was tested July 9, 1953. Long was not satisfied with its performance and did nothing further with it.

The second machine built in Long's plant was first tried out July 13 and 14, 1953. Long and his employees ran further tests with it through July and August. Several thousand people came to a widely publicized demonstration on Labor Day, September 7, 1953. Three more such machines made by Long were displayed at the North Carolina State Fair in mid-October of that year.

Long was encouraged by the reception accorded his machines. He set up production and sales organization and equipment at substantial expense. The venture enjoyed considerable commercial success in the 1954 season and again in 1955.

The W. R. Long patent application was not made until July 28, 1954. While it was pending, an examiner at-

tempted to force Long to set up an interference with claim No. 7 of Holliday's patent, which I shall set out in full later. Upon review in the Patent Office, it was held that the examiner was not authorized to force Long into an interference. The basis of that decision was that forced interferences are available when the subject matter of a prior patent is being claimed in different language, but not when the applicant simply refuses to make any claim which conflicts with the claims of a prior patent. The decision only dealt with Patent Office procedure. It is not subject to the interpretation that a device made by Long would not infringe Holliday's patent. It merely upheld Long's privilege to decline allowing that question to be determined in the Patent Office. In this connection it may be added that lack of interference at the Patent Office is not conclusive of noninfringement. *The University of Illinois Foundation* v. *Block Drug. Co.*, 133 F. Supp. 580, and cases cited therein. Long got his patent March 15, 1955.

The first controversy presented by this case ranges around claim No. 7 of the Holliday patent, which reads as follows: "A tobacco harvester comprising a frame, wheels supporting said frame, vertical members secured to said frame in spaced relationship to each other, vertically extending conveyor chains carried by said vertical members, drive means for actuating said chains, a platform secured on top of said frame, said chains extending upwardly above said platform from there below, said chains having spring pressed clips attached thereto for resiliently engaging and carrying tobacco leaves, a plurality of seats, and means adjustably suspending said seats from said vertical members in back of said chains."

During the trial, the Court made a first hand comparison of the machine manufactured by Harrington and the one manufactured by Long. They are very nearly alike. Holliday and Harrington contend that if Holliday's claim No. 7 is accorded due scope, Long's harvester constitutes an infringement, despite the inclusion on the accused harvester

of certain unpatentable improvements. Long contends that Harrington has never manufactured a machine within the scope of Holliday's patent. He says that Harrington, with the aid of Davis and others hired from Long's company, copied the Long machine, which was proving to be a commercial success, and infringed his patent. It is also denied that his machine infringes the Holliday patent.

The device described in Holliday's claim No. 7 is clearly worthy to be designated an invention. It is not "wanting in (any) unusual or surprising consequences from the unification of the elements here concerned. . . ." *A. & P. Tea Co.* v. *Supermarket Corp.*, 340 U. S. 147 at 152. Is it, however, a pioneer invention entitled to a broad range of equivalents? I believe that it is.

In *Westinghouse* v. *Boyden Power Brake Co.*, 170 U. S. 537, at 561, the Supreme Court discussed the term "pioneer" as it is used in patent law. "This word, although used somewhat loosely, is commonly understood to denote a patent covering a function never before performed, a wholly novel device, or one of such novelty and importance as to mark a distinct step in the progress of the art, as distinguished from a mere improvement or perfection of what had gone before. Most conspicuous examples of such patents are: The one to Howe, of the sewing machine; to Morse, of the electrical telegraph; and to Bell, of the telephone."

From *Dean Rubber Mfg. Co.* v. *Killian*, 106 F. 2d, 316 at 319, I quote the following language, substituting the name of Holliday for that of Killian. "Holliday was the first to produce a machine which successfully performed the function which had been formerly done by hand, and the mechanical performance of which had been long sought by the industry, and . . . the machine of the patent is, therefore, a pioneer invention."

The key word in Holliday's claim No. 7 is "vertical". The claim calls for "vertical members", "vertically ex-

tending conveyor chains", "means adjustably suspending said seats from said vertical members". The illustrations that accompany Holliday's patent show these parts to be truly vertical. However, the scope of patent claims are not to be strictly limited to the form illustrated in drawings. *Oates* v. *Camp*, 83 F. 2d 111; *Pangborn Corp.* v. *W. W. Sly Mfg. Co.*, 284 F. 217. In neither the Long machine nor the one manufactured by Harrington are all the frame members or all stretches of the conveyor chains truly vertical. They are substantially vertical.

Long contends that Holliday's claim is limited to a harvester with chains and side members, absolutely vertical. Holliday contends that "vertical member" in claim No. 7 refers to an entire side of the frame, the whole of which is in a truly vertical plane, and that the term does not refer merely to an individual element of the frame, which, though in the vertical plane of the whole, is not individually vertical. To clarify this contention, consider the letter N. Holliday says the entire character constitutes the "vertical member", not the slanting cross-bar solely. Holliday further argues that, if "vertical member" is not construed in his favor, the word "vertical" should be interpreted, or broadened, by the doctrine of equivalents, to include "substantially vertical".

The harvester illustrated in Holliday's patent is the model that he had in operation during the summer of 1953. It was truly a "homemade" machine. Modification and streamlining were necessary before the device could be produced commercially. As was pointed out in the much cited case, *Hildreth* v. *Mastoras*, 257 U.S. 27 at 34: "It is not necessary, in order to sustain a generic patent, to show that the device is a commercial success. The machine patented may be imperfect in its operation; but if it embodies the generic principle, and works, that is, if it actually and mechanically performs, though only in a crude way, the important function by which it makes the substantial change claimed for it in the art, it is enough." I hold

that the scope of Holliday's generic, or pioneer, patent is not limited to coverage of replicas of his original embodiment of the invention.

Claims are interpreted in the light of their file-wrapper history. A narrow claim that is allowed may not be broadened to encompass the subject matter of a wider claim that has been denied by the examiner. *Exhibit Supply Co.* v. *Ace Corp.*, 315 U. S. 126; *Schriber-Schroth Co.* v. *Cleveland Trust Co.*, 311 U. S. 211; *Smith* v. *Florence-Mayo Nuway Co.*, 182 F. 2d, 507. Holliday's history in the Patent Office indicates that he was under no compulsion to word his claim as it was done. "Vertical" was a random adjective chosen to describe the then existing form of the tobacco harvester. This is not a design patent. Form is not the essence of Holliday's invention. Form bears no more than an incidental relationship to the function that the device is designed to perform.

In *Specialty Equipment & Mach. Corp.* v. *Zell Motor Car Co.*, 193 F. 2d 513, the Court of Appeals for this Circuit had occasion to review at some length the doctrine of equivalents. The following language is from that opinion, page 518: "Very pertinent here with respect to the application of the doctrine of equivalents on the issue of infringement is the statement of the rule contained in *Union Paper Bag Machine Co.* v. *Murphy*, 97 U. S. 120, 125, as follows: " 'Except where form is of the essence of the invention, it has but little weight in the decision of such an issue, the correct rule being that, in determining the question of infringement, the court or jury, as the case may be, are not to judge about similarities or differences by the names of things, but are to look at the machines or their several devices or elements in the light of what they do, or what office or function they perform, and how they perform it, and to find that one thing is substantially the same as another, if it performs substantially the same function in substantially the same way to obtain the same result, always bearing in mind that devices in a patented

machine are different in the sense of the patent law when they perform different functions or in a different way, or produce a substantially different result.

" 'Nor is it safe to give much heed to the fact that the corresponding device in two machines organized to accomplish the same result is different in shape or form the one from the other, as it is necessary in every such investigation to look at the mode of operation or the way the device works, and at the result, as well as at the means by which the result is attained . . .

" 'Authorities concur that the substantial equivalent of a thing, in the sence of the patent law, is the same as the thing itself; so that if two devices do the same work in substantially the same way, and accomplish substantially the same result, they are the same, even though they differ in name, form, or shape. Curtis, Patents, 4th Ed., Sec. 310.' "

Graver Tank Mfg. Co. v. *Linde Air Products Co.*, 339 U. S. 605, presents a Supreme Court consideration of the doctrine of equivalents in which the foundation of the doctrine is repeated as being that one may not practice a fraud on a patent. The invention at stake was a formula for a flux used in welding. The accused substance substituted for a chemical named in the formula of the patentee's claim, a chemical from a different chemical group, which in combination with the patentee's other ingredients, produced the same reaction as that obtained with the patentee's complete formula.

The Court upheld the District Court's finding of equivalence in the accused formula and included the following language at page 609. "What constitutes equivalency must be determined against the context of the patent, the prior art, and the particular circumstances of the case. Equivalence, in the patent law is not the prisoner of a formula and is not an absolute to be considered in a vacuum. It does not reqnire complete identity for every purpose and

in every respect. In determining equivalents, things equal to the same thing may not be equal to each other and, by the same token, things for most purposes different may sometimes be equivalents. Consideration must be given to the purpose for which an ingredient is used in a patent, the qualities it has when combined with the other ingredients, and the function which it is intended to perform. An important factor is whether persons reasonably skilled in the art would have known of the interchangeability of an ingredient not contained in the patent with one that was."

I have already pointed out the context in which "vertical" was used in Holliday's patent. I have already undertaken to show that his invention was a pioneer in the field. I now propose to consider the functional purposes served by the "vertical" elements in Holliday's device and the interchangeability of those elements that would have been perceived by a reasonably skilled person in the farm implement art.

In Holliday's illustrated machine and in the machines manufactured by Harrington and Long, primers are carried beneath a platform that passes over the top of the tobacco plants. Conveyor chains and members attached to the frame connect the upper and lower levels of the harvesters. The frame members and chains necessarily extend in an upward, downward direction, since they serve to connect a higher and lower plane. It is of no consequence to the maintenance of this connection that it varies from a true 90 degree vertical. No advantage is derived from the variation.

Holliday and Harrington aptly point out in their brief that: "There is one point in the travel of the tobacco-carrying chains where it is desirable that the chains travel in a substantially vertical direction, using vertical in the restricted sense. This is the place in front of where the primer or picker sits. When it is realized that the seat on which the picker sits can be moved up and down over

a distance of some three or four feet, it can be seen why it is desirable that the chain in front of him be moving substantially in a specifically vertical direction in order that he not be moved either toward or away from the chain when the position of his seat is altered in an upward or downward direction. In this sense, there is a reason for a portion of the chain to move in a specifically vertical direction. An inspection of the Long patent shows that this portion of the chain in the Long machine also moves in a specifically vertical direction, for exactly the same reason. The most recent model of the Long machine has long stretches of vertical chains, and also vertical seat supports."

The quibble in this case over the word "vertical" brings to mind the Supreme Court's disposition of a similar contention regaring the word "parallel" found in *Elizabeth* v. *Pavement Co.*, 97 U. S. 126 at 138. "It is objected, that the blocks of the Elizabeth pavement have not parallel sides, as prescribed in Nicholson's patent, by reason of the notch or groove in the side, into which the strips are fitted; but this notch or groove does not take from the blocks their general conformity to the requisition of the patent."

Turning now from Holliday's patent, let us consider the alleged infringement of Long's patent. Holliday and Harrington insist that Long's patent is completely void by reason of Title 35, U. S. C. A., Sec. 102, which proscribes the issuance of a patent for an invention that has been in public use more than one year before the patent application date. As I indicated earlier, I do not find that the evidence lends any support to the theory that the use of Long's harvester between July 14 and July 28, 1953, was, in any sense, other than experimental.

The part of Long's patent alleged to be infringed is that which calls for "a conveyor . . . having a substantially horizontal run of substantial extent above said platform

to facilitate removal of leaves from said conveyor, a series of clips carried by said conveyor for receiving leaves to be conveyed, each clip being pivotally mounted so that it will be disposed in substantially the same angular position on the run where they are removed therefrom, . . ." A horizontal run of the conveyor chain and pivotal clips are not found in Holliday's patent. Long's harvester and the type made by Harrington have pivotal clips. Harrington extended the chain in a zig-zag manner. Also merely horizontal.

I do not agree with Holliday and Harrington that Long's pivotal clips and chain arrangement are "mere structural changes which involve nothing more than the exercise of the skill of the art (and) do not rise to the dignity of invention". *Thompson* v. *American Tobacco Co.*, 174 F. 2d, 773, 777. They added a decided advantage to the operation of the harvesters in which they were incorporated. The two improvements, in combination, serve to give the looper more time to remove the tobacco from the chain.

And in addition to this is the presumption arising from the imitation of the patented article by the manufacturer of the alleged infringing device. As to this, we agree with what was said by Judge Hough, speaking for the Circuit Court of Appeals of the Second Circuit in *Kurtz* v. *Belle Hat Lining Co.*, 280 F. 277, 281: " 'The imitation of a thing patented by a defendant, who denies invention, has often been regarded, perhaps especially in this circuit, as conclusive evidence of what the defendant thinks of the patent, and persuasive of what the rest of the world ought to think.' " *Black & Decker Mfg. Co.* v. *Baltimore Truck Tire Serv. Corp.*, 40 F. 2d, 910, 914. See also *Ackerman's* v. *General Motors*, 202 F. 2d, 642. Long's patent is not invalid for want of invention.

However, it is only a patent for improvements on Holliday's pioneer invention. An improvements patent is accorded only a narrow range of equivalents. Its scope is

limited substantially to the devices disclosed in the specifications and drawings. *Westinghouse Electric Corp.* v. *Bulldog Elec. Prod. Co.,* 106 F. Supp. 819, 870, and cases cited therein. But, to avoid infringement of a patent with even this narrow scope, the accused device must amount to more than merely a colorable departure from the invention. *Sanitary Refrigerator Co.* v. *Winters,* 280 U. S. 30.

The Harrington imitation of Long's improvements cannot escape the accusation of infringement even under this easy test. The attempt made to "get off" Long's patent by altering the extended horizontal run of the chain from a straight line to a zig-zag line constitutes no more than an ineffectual subterfuge, ineffectual to add any advantage over Long's improvement, ineffectual to prevent a clear reading of the device on Long's claim. The pivotal clips are virtually indistinguishable. The finding that Harrington infringed Long's patent on these devices is further bolstered by substantial evidence of Harrington's hiring Davis and other employees from Long.

The monopoly of a pioneer patent and the monopoly of an improvement patent are mutually exclusive. *Binney & Smith Co.* v. *United Carbon Co.,* 125 F. 2d, 255. The making of patentable improvements does not avoid infringement. *Acme Steel Company* v. *Eastern Venetian Blind Company,* 130 F. Supp. 459. The improver is liable as an infringer if he appropriates the basic invention without license. *Temco Company* v. *Apco Company,* 275 U. S. 319. "Two patents may both be valid when the second is an improvement on the first, in which event, if the second includes the first, neither of the two patentees can lawfully use the invention of the other without the other's consent." *Cantrell* v. *Wallick,* 117 U. S. 689, 694, as quoted in *Wine Railway Appliance Co.* v. *Baltimore & O. R. Co.,* 78 F. 2d, 312, 316.

In accord with the foregoing opinion, the defendants Long Manufacturing Company, Long Tobacco Harvesting Company, and W. R. Long will be enjoined from commit-

ting further acts of infringement of Holliday's patent No. 2,672,248. Long Manufacturing Company, which produced the infringing harvesters, and Long Tobacco Harvesting Company, the sales outlet, will be liable for damages to compensate for the infringement, but in no event less than a reasonable royalty for the use made of the invention by these infringers. An accounting shall be made to aid in determining the amount of damages due.

It does not appear from the evidence that the defendant W. R. Long, though the principal owner of the defendant corporations, was merely using the corporations as a fraudulent cloak to carry on the infringement of other's patents; nor was his activity in connection with the plaintiff's patent carried on beyond the scope of his authority as a corporate officer. He is not personally liable to Harrington or Holliday for damages.

Similarly, Harrington Manufacturing Company, J. J. Harrington, and Jim Brown Holliday will be enjoined from committing further acts of infringement of Long's patent No. 2,704,158. Harrington Manufacturing Company will be liable for damages to compensate for the infringement, but in no event less than a reasonable royalty for the use made of the invention by this infringer. An accounting shall be made to aid in determining the amount of these damages also.

J. J. Harrington is exempted from personal liability on the basis of his relationship with Harrington Manufacturing Company and with the infringement, which relationship I find to be parallel to that held by Long.

I find for neither plaintiff a flagrant, willful infringement that justifies increased damages. In addition to so finding, I deny increased damages as a matter of discretion.

Neither plaintiff may recover attorney fees.

Each party shall bear its own costs.

(S.) Don Gilliam,
United States District Judge.

UNITED STATES COURT OF APPEALS
FOR THE FOURTH CIRCUIT.

No. 7383.

LONG MANUFACTURING COMPANY, INC., LONG TOBACCO HARVESTING COMPANY, INC., AND W. R. LONG, *Appellants*,

v.

JIM BROWN HOLLIDAY AND HARRINGTON MANUFACTURING COMPANY, INC., *Appellees*.

No. 7384.

HARRINGTON MANUFACTURING COMPANY, INC., J. J. HARRINGTON, AND JIM BROWN HOLLIDAY, *Appellants*,

v.

LONG MANUFACTURING COMPANY, INC., *Appellee*.

APPEALS FROM THE UNITED STATES DISTRICT COURT FOR THE EASTERN DISTRICT OF NORTH CAROLINA, AT WASHINGTON.

(Argued April 11, 1957. Decided May 27, 1957.)

Before PARKER, Chief Judge, and SOBELOFF and HAYNSWORTH, Circuit Judges.

A. Yates Dowell and A Yates Dowell, Jr., (Henry C. Bourne on brief) for Appellants in No. 7383 and Appellee in No. 7384, and Robert F. Davis (John H. Lewis, Jr., Harvey B. Jacobson, J. A. Pritchett and H. Vinson Bridgers on brief) for Appellees in No. 7383 and Appellants in No. 7384.

HAYNSWORTH, Circuit Judge:

The parties in these two cases, involving interrelated factual situations, are, together with their associates and licensees, owners of two separate patents issued on tobacco harvesters. Their conflicting interests led to the institution of these two actions in which each patentee maintains that his patent is valid and infringed by the other patentee and his licensee.

The two cases were consolidated for trial after which the District Court held that the device of the Holliday patent No. 2,672,248 issued March 16, 1954, was a generic or pioneer invention entitled to a wide range of equivalents while the device of the Long patent No. 2,704,158 issued March 15, 1955, embodied certain patentable improvements. Since the machine actually manufactured and sold by each is substantially that disclosed in the Long patent, it was held that Long and his accociates had infringed the valid Holliday patent and that Holliday and his licensee had infringed Long's valid improvement patent. It was the judgment of the District Court that each of the patentees should have injunctive relief and compensatory damages from the other.

The defendants in each case have appealed to this Court.

The bright leaf tobacco grown in the Carolinas and Virginia is a plant consisting of a single stalk, which at maturity may be from five to seven feet in height. At intervals, broad tobacco leaves, from six to twenty-four inches in length, grow directly from the stalk.

The leaves do not ripen uniformly. Those nearest the ground are the first to ripen while those at the top of the stalk are the last. It is necessary, therefore, to have successive harvestings of the same field. The lower, ripened leaves are selected and picked by hand, while the higher unripened leaves are left to ripen for later harvestings.

The commonly accepted method of harvesting and stacking such tobacco, prior to 1953, was entirely a hand operation. Pickers, or "primers," would walk through a field,

selecting and picking the ripe leaves which they placed upon a cart or sled. When filled with leaves, this conveyance was taken out of the field where "handers" arranged the leaves in convenient bundles and passed the bundles to "loopers" who tied the bundles to a stick. Many such bundles were attached to each stick until a filled stick was placed in a rack from whence it was removed to the curing barn where it was again placed on racks.

Throughout the broad field of agriculture, the rising cost of farm labor, coupled with acreage restrictions, has made such manual operations more and more uneconomic and has resulted in a rapidly accelerating mechanization of agriculture.

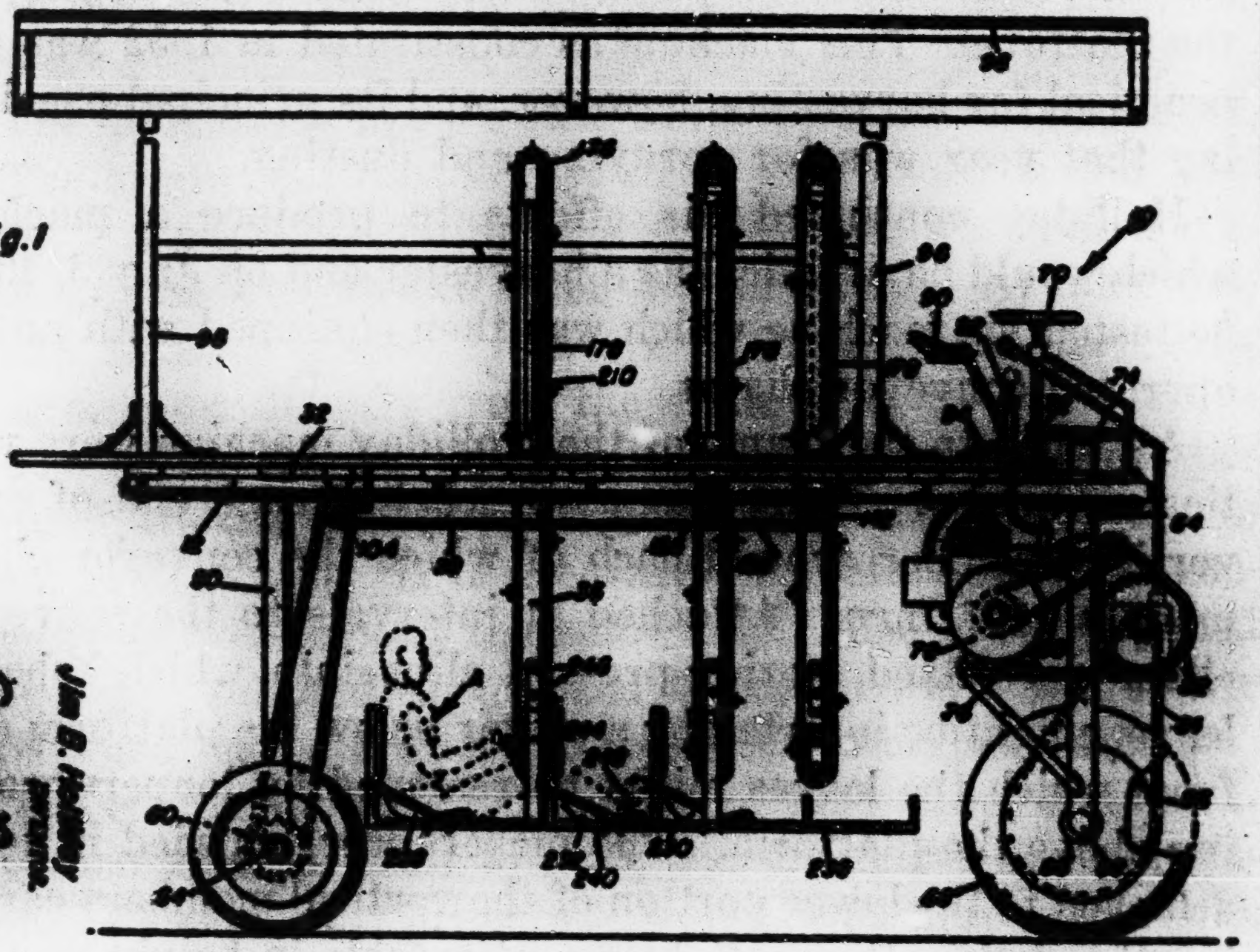
Tobacco farmers were not unconscious of these pressures and Holliday and Long, apparently entirely independently, each conceived the idea of a mechanical tobacco harvester.

In 1952 Holliday constructed a crude high clearance machine having a platform above the height of mature tobacco plants and equipped with hand operated conveyor chains by which tobacco leaves might be passed from pickers on seats below the platform to "loopers" working on the platform. This machine as constituted in 1952 was not practical for harvesting, however, and its principal use during that year was for spraying and dusting.

Holliday continued his efforts to produce a machine which would be practical as a harvester and on July 3, 1953, he tested his machine which was then equipped with power operated conveyor chains.

Attached to the frame of the Holliday machine were vertical members. There was a sprocket at each end of each vertical member around each of which the conveyor chain made a 180° turn. Attached at intervals to the conveyor chain were fixed, spring-pressed clips into which tobacco leaves might be inserted by a picker below the platform and from which the leaves might be removed by loopers working above the platform. The pickers were carried in seats attached to the lower portion of the vertical members carrying the chains, the seats being adjustable in height so that

Fig. 1

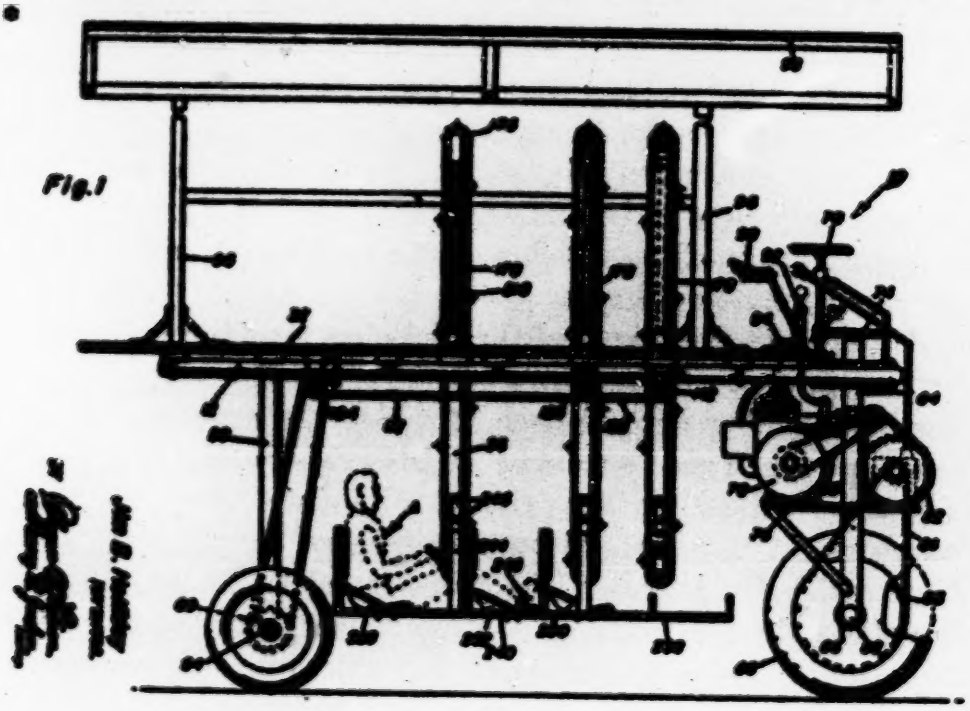


throughout the harvesting season, the picker would be within convenient reach of the ripened leaves.

This was the machine of the Holliday Patent No. 2,672,248. It is shown in the margin in a diagramatic drawing, *, and is fairly described in claim No. 7, the only claim of that patent involved in this controversy:

> "A tobacco harvester comprising a frame, wheels supporting said frame, vertical members secured to said frame in spaced relationship to each other, vertically extending conveyor chains carried by said vertical members, drive means for actuating said chains, a platform secured on top of said frame, said chains extending upwardly above said platform from therebelow, said chains having spring pressed clips attached thereto for resiliently engaging and carrying tobacco leaves, a plurality of seats, and means adjustably suspending said seats from said vertical members in back of said chains."

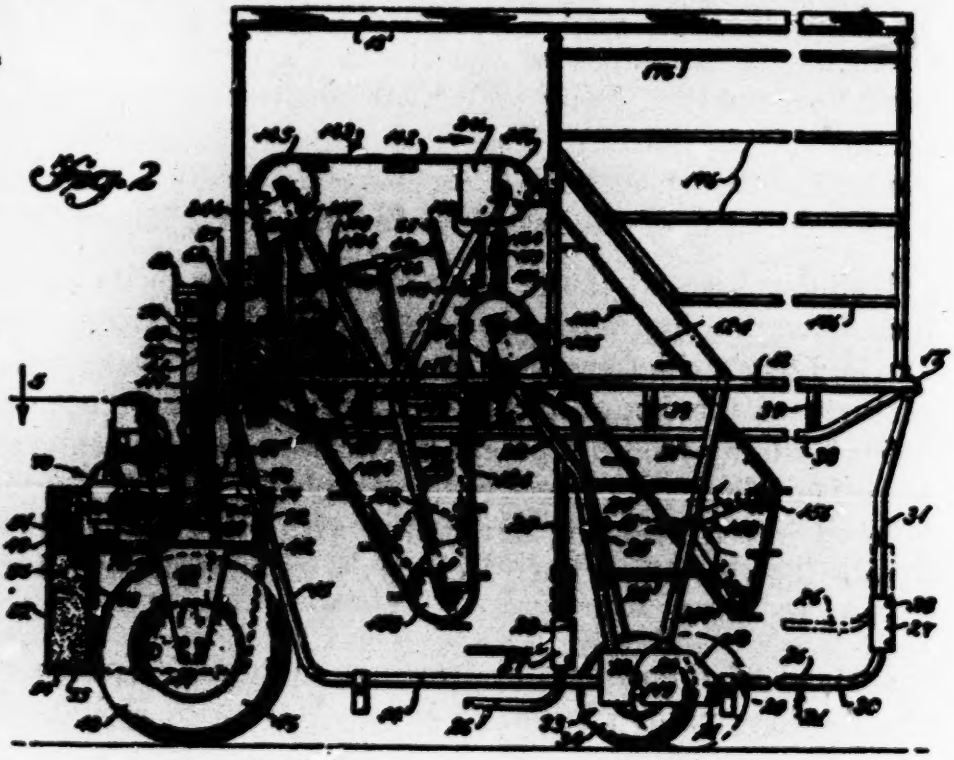
The Holliday machine had certain practical deficiencies. The comparatively short vertical run of the conveyor chain



above the platform did not permit loopers on the platform to keep pace with the pickers below. Leaves which were not removed on the rising run of the chain, being held in fixed clips, were inverted when they passed over the upper sprocket with resultant damage to the leaves.

Meanwhile, quite independently, Long had been working to produce a machine which would accomplish the same result sought by Holliday. Long was a manufacturer of farm implements, and he and his chief engineer, one Davis, worked concurrently upon two different approaches to the problem.

Long's approach, and the one ultimately adopted, was, as Holliday's, a high clearance, three wheeled, motorized machine, shown in a diagramatic drawing in the margin. * * As in Holliday, loopers worked from the high level platform where they removed from the conveyor, bundled and stacked tobacco leaves which had been picked by pickers who were carried in seats, adjustable in height, below the



platform. Each conveyor chain, unlike Holliday, however, ran over seven sprockets, affixed to a variety of members. These sprockets carried each chain in front of each of two pickers below the platform and provided it with a substantially horizontal run above the platform in the work space of the loopers. Attached to the chain were spring-pressed clips, pivotally mounted so that the tobacco leaves would hang downward at every point in the run of the conveyor. The adjustable seats for the pickers were affixed to members of the frame having no direct connection with other members carrying the sprockets of the conveyor system.

An essential element of each claim of the Long patent is the combination of a conveyor chain having "a substantially horizontal run of substantial extent" above the platform and pivotally mounted clips to carry the leaves of tobacco.

Long's machine was first tested in the field on July 13, 1953, ten days after Holliday's first test of his machine.

After a public demonstration of an improved version of the Long machine on Labor Day, 1953, and a showing of three of the machines at the North Carolina State Fair later that autumn, Long undertook to promote and manufacture his harvester. This was done at substantial expense, but it proved to be a commercial success. His company sold 1,429 of the machines in 1954 and 2,120 in 1955.

Holliday learned of the Long machine prior to its public demonstration in September 1953. He had talked with Davis, Long's chief engineer, and had obtained from Davis, pictures of the Long machine. Thereafter, on October 9, 1953, Holliday filed his patent application, but he achieved no other significant step until March 5, 1954, when he entered into a licensing agreement with Harrington Manufacturing Company, Inc. Holliday's patent was issued on March 16, 1954.

Instead of following the drawings and specifications of the Holliday patent, however, Harrington, with Holliday's

assistance, proceeded to manufacture machines which, substantively, were literal copies of Long's machine. Subsequently, Harrington employed Long's former chief engineer, Davis, in connection with that and other work.

In 1954 Harrington manufactured approximately 60 harvesters and in 1955 approximately 1,050, all being substantially identical to Long's machine.

The parties, in argument in this Court, do not seriously question that each of the patented devices involved some novelty amounting to invention. Long's principal contention is that his machine does not infringe the Holliday patent while Holliday contends that the Long patent is invalid because of claimed public use of the Long machine more than one year prior to the date of Long's patent application.

Claim 7 of the Holliday patent provides for vertical members, secured to a frame, vertically extending conveyor chains carried by the vertical members and with means for adjustably suspending seats from the vertical members.

We are asked to construe the word "vertical" as used in Holliday's claim as a "random adjective" implying no more than the functional purpose of the conveyor to elevate material from one level to another, and the term "vertical member" as syonymous with all of the side members of the Long machine which, in the aggregate, happen to be in a substantially vertical plane. But Holliday's contribution, in the light of the prior art, does not warrant such liberal construction of the language of his claim.

An inventor has a right to define specific terms as used in a patent, and, while the drawings and specifications may not enlarge the scope of the claims, they may be considered in determining the inventor's definition of the terms he employed. *Black & Decker Mfg. Co.* v. *Baltimore Truck Tire Service Corporation*, 4 Cir., 40 F (2d) 910; *Hutzler Bros. Co.* v. *Sales Affiliates, Inc.*, 4 Cir., 164 F (2d) 260; *City of Grafton* v. *Otis Elevator Co.*, 4 Cir., 166 F (2d) 816.

Should there be any doubt from the language of claim 7 that Holliday used the terms "frame" and "vertical member" in contradistinction to each other, it is clear from the drawings and specifications that he did. He showed in his drawings and described in his specifications "vertical members," carrying the conveyor chains and adjustable seats, which are not an integral part of the frame but are merely "welded or otherwise secured to the transverse members" of the frame.

The Long machine, as any box-like structure, has combinations of members through which, in a geometric sense, vertical planes may be passed. It does not have "vertical members" in the sense that term is employed in the Holliday patent. The literal language of claim 7 of the Holliday patent cannot be read directly on the Long machine.

An examination of the prior art convinces us that Holliday's machine was not a pioneer invention and that the restrictive language of the claim was employed advisedly in order to avoid the prior art.

As the District Court found, "high clearance machines, in the farm implement art" designed to pass over the tops of growing plants "have long been used for such purposes as detasseling corn, spraying and dusting crops." They were also known and used for harvesting.

In 1918 patent No. 1,275,781 was issued to Stark et al, for a high clearance cotton harvester. Seats were provided for the pickers and there was a conveyor to carry the cotton to the upper level of the machine. The seats were not adjustable in height and the conveyor was not truly vertical.

In 1950 patent No. 2,518,965 was issued to Whitley for a high clearance tobacco harvester. Seats for the pickers were adjustable in height. There was, however, no mechanical conveyor system. The tobacco leaves were passed by hand from the pickers below to the lopers above the platform.

In 1955 patent No. 2,702,134 was issued to Alphin, upon an application filed in 1952, for a toba co harvester having a conveyor belt to carry the leaves from the pickers in seats near the ground to loopers riding on a high clearance platform. The seats for the pickers were not adjustable in height and the machine was subject to the practical disadvantage of being propelled by a conventional tractor rather than a single motorized wheel. Holliday had seen a picture of the Alphin machine and knew of it when he was working upon his own.

What Holliday did, therefore, was to combine the well-known high clearance self-propelled platform with adjustable seats for the pickers as shown in the Whitley patent and to substitute a vertical chain conveyor with fixed, spring-pressed clips for the inclined conveyor belts of the Alphin and Stark patents.

While Holliday's machine may not have been wanting in invention, it was not the first mechanical harvester with mechanical means for elevating material from a lower level to workers on a high clearance platform, nor even the first specifically designed for harvesting tobacco. It was a combination of known elements and it was subject to practical deficiencies, mentioned above, of such consequence that it was never commercially produced.

The limited contribution of the Holliday machines does not warrant the broad construction urged upon us. To adopt it would extend the language of the claim far beyond the apparent intention of the inventor and raise grave doubt of the validity of this claim of the patent in the light of the prior art. Against the background of earlier use of conveyor systems in mechanical, high clearance harvesters, Holliday could not have claimed the use of conveyors for the function of elevating tobacco leaves. Quite properly he restricted his claim to the particular conveyor system disclosed by him. The restricted language of his claim, describing his conveyor system, should not now be expanded

to preclude the use of other conveyor systems of substantially different design and arrangement.

Assuming that the Holliday machine involved patentable invention, his patent is entitled to a reasonable range of equivalents. In determining the extent of the range of equivalents, however, we must consider the state of the prior art, the novelty and contribution of the claimed invention, the nature and extent of the differences between the patented and the accused devices, the scope of the claim of the patent and the limitations inherent in it and other surrounding circumstances. *Graver Tank & Mfg. Co.* v *Linde Air Products Co.*, 339 U. S. 605, 70 S. Ct. 854, 94 L. Ed. 1097. Protection of a patent is not to be denied because of inconsequential differences, nor should one be allowed to work a fraud upon a patent by the substitution of obvious equivalents which serve no useful purpose. *Graver Tank & Mfg. Co.* v. *Linde Air Products Co.*, supra; *Black & Decker Mfg. Co.* v. *Baltimore Truck Tire Service Corp.*, 4 Cir., 40 F (2d) 910; *Saco-Lowell Shops* v. *Reynolds*, 4 Cir., 141 F (2d) 587; *Wine Ry. Appliance Co.* v. *Baltimore & O. R. Co.*, 4 Cir., 78 F (2d) 312. On the other hand, restricted claims and narrow combination or paper patents should not be so expanded as to preempt an entire generic field. *Harford A. & B. Assn.* v. *Puett Electric Starting Gate Corp.*, 4 Cir., 182 F (2d) 608; *Wheeling Stamping Co.* v. *Standard Cap & Molding Co.*, 4 Cir., 155 F (2d) 6; *Scott & Williams, Inc.* v. *Whisnant*, 4 Cir., 126 F (2d) 19.

Construing Holliday's claim as we do, its range of equivalents, in the light of the prior art, is, at most, comparatively narrow.

The "vertical members" specified in Holliday's claim are not found in Long's machine. The frames of the two machines are clearly equivalent, but portions of the frame of Long's are not the equivalent of the conveyor system of the Holliday device or of Holliday's "vertical members," which are the heart of his conveyor system.

We conclude that the Long machine does not infringe claim 7 of the Holliday patent.

In reaching this conclusion, we are mindful that Holliday and Long were working independently and contemporaneously. The record does not disclose that Long even knew of Holliday's work, or that he pirated anything from Holliday. The record is clear that Long's machine was not subject to the deficiencies of the device of the Holliday patent, that it met with immediate commercial success and that it was promptly copied by Holliday and his licensee.

It is true, of course, that one who merely improves the device of a basic patent may not appropriate to himself all of the rights of the basic patentee, but we should be reluctant to so extend a narrow and specific claim as to protect the copyist from the effective innovator.

We agree with the District Court that the machine of Long's patent No. 2,704,158 involved patentable invention. As indicated earlier, it combined, in a different way, the same known elements used by Holliday. The differences, however, were significant. The provision for a "substantially horizontal run of substantial extent" of the conveyor above the platform and the use of pivotally mounted clips overcame the deficiencies of the Holliday machine and resulted in the first really practicable tobacco harvester. It was the first to achieve commercial success, and it was promptly copied by Holliday and his licensee, Harrington.

These are all indicia of invention in a field in which others were conscious of the problem and had sought, without success, to solve it.

While many of the machines manufactured by Harrington were literal copies of the Long machine, others incorporated a variant which was introduced to avoid the claims of the Long patent. This variant was the introduction of three additional sprockets during the course of the extended horizontal run of the conveyor above the platform.

These sprockets converted the substantially horizontal run of the conveyor above the platform from a straight line to a series of zigzags. The terminal sprockets above the platform were at substantially the same elevation, however, and the overall course of the zigzags was horizontal.

We agree with the finding of the District Court that the zigzags added nothing to the performance or function of the machine and were ineffectual to avoid Long's claim to a "substantially horizontal run."

Holliday and Harrington, in Long's suit, while setting up the usual defenses of invalidity for lack of invention and non-infringement, rely principally upon the claim that Long's machine was in public use more than one year prior to the filing of his patent application.

Long's machine was first tested on July 13, 1953. It was apparent in this test that the pickers could not keep the loopers busy so he modified the conveyor system to add two more pickers. This modification was accomplished that evening and the machine was again tested in the field on July 14, 1953. Long testified the machine performed very satisfactorily on the 14th.

During the following weeks it was used in the harvesting of tobacco in fields owned by Long's father and once in the field of a neighbor.

Long characterized these uses as experimental or tests and there is nothing in the record to indicate that Long derived any financial gain from them or that they approached a start of commercial exploitation.

Holliday, whose licensee now questions Long's use, had testified that he had felt it necessary to test his machine throughout the harvesting season to be certain it would operate in the same manner when pulling leaves near the top of the stalk as it did early in the season when the ripened leaves were close to the ground.

Long testified that his "tests," during the summer of 1953, resulted in a number of changes. He changed the brakes from the front to the rear wheels to give the machine greater stability. He redesigned the auxiliary power system to avoid its sucking in tobacco leaves. Finally, he replaced his pivotally mounted weighted clips with L-shaped clips, similarly mounted, because the weights interfered with the leaves passing over them.

The record indicates that perhaps all of Long's use of his machine prior to his advertised "public demonstration" on September 7, 1953 was experimental. Certainly, we find no reason to disagree with the finding of the District Court that the use prior to July 28, 1953, the critical date under the provisions of the statute, 35 U.S.C. 102 (b), was anything other than experimental. Long's expression of satisfaction with the operation of the machine on July 14th is not inconsistent with a recognition of the necessity of further testing and experimentation, particularly when the record affirmatively shows that further testing and experimentation was conducted.

Ever since *Elizabeth* v. *American Nicholson Pavement Co.*, 97 U. S. 126, 24 L. Ed. 1000, it has been clear that necessary testing and experimentation by the inventor for a not unreasonable period of time is not a public use within the meaning of Section 102 (b) of the Act.

On abundant evidence it has been found here that the inventor's use during the critical period was experimental only and did not constitute a public use. See: *Smith & Griggs Mfg. Co.* v. *Sprague*, 123 U. S. 249, 8 S. Ct. 112, 31 L. Ed. 141; *Cline Electric Mfg. Co.* v. *Kohler*, 7 Cir., 27 F. 638; *General Electric Co.* v. *Minneapolis-Honeywell Regulator Co.*, 2 Cir., 118 F. (2d) 278; *Picard* v. *United Aircraft Co.*, 2 Cir., 128 F. (2d) 632; *Metallizing Engineering Co.* v. *Kenyon Bearing & Auto Parts Co.*, 2 Cir., 153 F. (2d) 516; *Merrill* v. *Builders Ornamental Iron Co.*, 10 Cir., 197 F. (2d) 16; *Lyon* v. *Bausch & Lomb Optical Co.*, 2 Cir., 224 F. (2d) 530, affg. 119 F. Supp. 42.

A much longer period than the two weeks that were involved could hardly be regarded as excessive for testing the function and utility of a rather complicated machine, newly conceived and newly constructed and for experimentation looking toward essential changes and adjustments.

The judgment of the District Court in case No. 7383 is reversed and the cause remanded for the entry of final judgment for the appellants, Long Manufacturing Co., et al.

The judgment of the District Court in case No. 7384 is affirmed and the cause remanded for the assessment of compensatory damages and further proceedings in accordance with that judgment.

Case No. 7383, *Reversed and Remanded*

Case No. 7384, *Affirmed*

Decree

Filed and Entered May 27, 1957.

UNITED STATES COURT OF APPEALS
FOR THE FOURTH CIRCUIT

No. 7383.

LONG MANUFACTURING COMPANY, INC., LONG TOBACCO HARVESTING COMPANY, INC., and W. R. LONG, *Appellants,*

vs.

JIM BROWN HOLLIDAY and HARRINGTON MANUFACTURING COMPANY, INC., *Appellees.*

APPEAL FROM the United States District Court for the Eastern District of North Carolina.

THIS CAUSE came on to be heard on the record from the United States District Court for the Eastern District of North Carolina, and was argued by counsel.

ON CONSIDERATION WHEREOF, It is now here ordered, adjudged and decreed by this Court that the judgment of the said District Court appealed from, in this cause, be, and the same is hereby, reversed with costs; and that this cause be, and the same is hereby, remanded to the United States District Court for the eastern District of North Carolina, at Washington, with direction to enter final judgment for the appellants in accordance with the opinion of the Court filed herein.

May 27, 1957.

CLEMENT F. HAYNSWORTH, JR.
United States Circuit Judge.

June 19, 1957, petition of appellees for extension of time to file petition for rehearing filed.

JOHN T. FEY, Clerk

IN THE

Supreme Court of the United States

No. 654

JIM BROWN HOLLIDAY and HARRINGTON MANUFACTURING COMPANY, INC.,
Petitioners

v.

LONG MANUFACTURING COMPANY, INC., LONG TOBACCO HARVESTING COMPANY, INC., and WILLIAM R. LONG,
Respondents

MEMORANDUM IN OPPOSITION TO THE PETITION FOR WRIT OF CERTIORARI

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MEMORANDUM IN OPPOSITION TO THE PETITION FOR WRIT OF CERTIORARI

Careful consideration of the petition and the facts and circumstances involved fails to uncover any merit in the petition or any justification for the attack on the Court of Appeals of the Fourth Circuit and its decision which accurately interpreted the facts and correctly applied the law in the execution of its function in the administration of justice.

This is not a case in which there are conflicting decisions of different Circuit Courts of Appeals. It is not a case where there is a question of great public interest and of far-reaching importance. It is just a case

where a losing party is dissatisfied with the decision of a Circuit Court of Appeals. The fact that the appellate court gave careful and full consideration to all phases of the case is revealed by its 14-page decision (App. 15a-28a*).

There are many decisions which set forth the guiding legal principles on which this case was decided and apparently these are adequate since petitioners have not asserted that there is any need for others.

As noted by the Court of Appeals (App. 21a)

> "Claim 7 of the Holliday patent provides for vertical members secured to a frame, vertically extending conveyor chains carried by the vertical members and with means for adjustably suspending seats for workmen from the vertical members".

The District Court in its decision did not attribute to the word "vertical" its usual meaning of "perpendicular" or "upright" but, on the other hand, gave it a broader significance designating it a "random adjective" and indicating that the actual meaning was travelling from a lower to a higher elevation, and based its interpretation on its holding that the Holliday machine was a *pioneer* invention.

In making this interpretation there was no mention of the prior art and it is to be presumed that this was an oversight in view of the fact that prior art was in evidence in the record and was referred to in the pleadings of both parties.

The District Court acknowledged that in the farm implement art high clearance machines designed to

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* References are to the appendix to the petition unless otherwise noted.

pass over the tops of growing plants had long been used for detasseling corn, spraying, dusting, and harvesting, but stated that none had been made for tobacco harvesting (App. 3a). Mr. Long testified that in building his machine he purchased and started with a high clearance corn detasseling machine. No reference was made by the District Courts to prior art patents in the record including the prior art cited by the Patent Office over which the claim in question was allowed. In view of this prior art it was necessary for Holliday to restrict his claim, so consequently the terminology of the claim must be given its normal meaning, and the Court of Appeals so held.

The Court of Appeals stated (App. 22a)

> "Should there be any doubt from the language of claim 7 that Holliday used the terms 'frame' and 'vertical member' in contradistinction to each other, it is clear from the drawings and specifications that he did. He showed in his drawings and described in his specifications 'vertical members', carrying the conveyor chains and adjustable seats, which are not an integral part of the frame but are merely 'welded or otherwise secured to the transverse members' of the frame.
>
> The Long machine, as any box-like structure, has combinations of members through which, in a geometric sense, vertical planes may be passed. It does not have 'vertical members' in the sense that term is employed in the Holliday patent. The literal language of claim 7 of the Holliday patent cannot be read directly on the Long machine.
>
> An examination of the prior art convinces us that Holliday's machine was not a pioneer invention and that the restrictive language of the claim was employed advisedly in order to avoid the prior art."

The Appellate Court found that high clearance machines in the farm implement art designed to pass over the top of growing plants had long been used not only for detasseling corn but for spraying, dusting and tobacco harvesting and the Court mentioned the prior art patents to Stark et al. 1,275,781 (Joint Appendix 34 A, Long Exhibit 14), Whitley 2,518,965 (Joint Appendix 37 A, Long Exhibit 14) and Alphin 2,702,134 (Joint Appendix 30 A, Long Exhibit 13), and commented upon the fact that Holliday had seen a picture and knew of the Alphin high clearance tobacco harvester before he began working on his own machine.

The Appellate Court held that what Holliday did was to combine the well-known high clearance self-propelled platform with adjustable seats for the pickers of the Whitley patent, and then constructed the vertical chain conveyor with fixed spring-pressed clips for the inclined conveyor belts of the Alphin and Stark patents (App. 23a).

Unlike the District Court, the Appellate Court considered the prior art patents above noted and held (App. 23a) that the Holliday machine was not the first mechanical harvester with mechanical means for elevating material from a lower level to workers on a high clearance platform, nor the first specially designed for harvesting tobacco; that it was a combination of known elements subject to deficiencies of such consequence that it was never commercially produced; that the limited contribution of the Holliday machine does not warrant the broad construction urged, that to adopt such broad construction would extend the language of the claim far beyond the apparent intention of the inventor and raise grave doubt of validity in the light of the prior art.

The Appellate Court also held that Holliday was not entitled to claim the use of conveyors broadly for elevating tobacco leaves in view of the prior art; that quite properly Holliday restricted his claim to the particular conveyor system and the restricted language should not be expanded to preclude the use of other conveyor systems. The Court of Appeals reversed the District Court in holding that "vertical" was a random adjective and that Holliday had made a "pioneer" invention. The challenged decision is well worded, clear, logical and accurate and it indicates careful consideration of the subject matter by the Court of Appeals.

The petition charges that the Court of Appeals (1) lacked understanding of the facts, (2) failed to comply with Rule 52(a) of the Federal Rules of Civil Procedure, and (3) construed the patent claim literally and consequently incorrectly, thereby nullifying the protection which the patent is supposed to afford. In its argument, the petition refers to the District Court Judge, a native of North Carolina, as earthy, practical and familiar with the harvesting problems. This reveals the desperation and determination of petitioner but proves nothing. The presiding judge of the 4th Circuit Court of Appeals is a native, and apparently a lifelong resident, of North Carolina, familiar with the harvesting of tobacco, and of great experience on the Federal bench including in patent cases. The associate judge who wrote the decision is apparently a lifelong resident of South Carolina and likewise familiar with the harvesting of tobacco. The difference between the District Court and the Court of Appeals, in the consideration of the case, was that the Court of Appeals

noted the prior art which the lower Court apparently, at least momentarily, overlooked and thus removed the "pioneer" halo which the District Court placed upon Holliday by the holding that the word "vertical" was not restricted to its normal meaning.

The Court of Appeals, therefore, understood the facts. The charge that it failed to comply with Rule 52(a) is without merit because the District Court made a mistake and Rule 52(a) provides for correction where the findings are clearly erroneous and the Court of Appeals in correcting the error of the District Court complied with instead of violating this rule, the prior art evidence in the record clearly indicating the erroneousness of the District Court's holding that Holliday's was a "pioneer" patent.

The Court of Appeals has not nullified, changed, or limited the scope of the Holliday patent but has found that

> "an examination of the prior art convinces us that Holliday's machine was not a pioneer invention"

and that the restrictive language of the claim was employed necessarily or advisedly in order to avoid the prior art. (App. 22a).

This petition seeks to have the scope of the patent enlarged to an unwarranted breadth which the Court of Appeals did not find justified and refused to permit.

There is no indication of error presented by the Court of Appeals overturning the findings of the District Court which overlooked controlling evidence, but, on the other hand, there is a clear indication of full consideration of the facts and which facts and

evidence had a material bearing upon the issue, and the Court of Appeals corrected the oversight of the District Court.

There is no occasion justifying or requiring review of decision of the Court of Appeals of the Fourth Circuit and, therefore, it is respectfully submitted that the petition is without merit and should be denied.

Respectfully,

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